



SEQUENCE LISTING

<110> Bell, John C.
Sonenberg, Nahum
Stojdl, David F.
Brown, Earl G.
Atkins, Harold L.
Marius, Ricardo M.
Lichty, Brian D.
Knowles, Shane B.

<120> ONCOLYTIC VIRUS

<130> 18003-D1

<140> US 10/743,639
<141> 2003-12-22

<150> US 09/664,444
<151> 2000-09-18

<150> 60/287,590
<151> 1999-09-17

<160> 52

<170> PatentIn Ver. 2.1

<210> 1
<211> 11
<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic peptide

<400> 1

Cys Thr Thr His Arg His His Thr Ser Asn Cys
1 5 10

<210> 2

<211> 12

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic peptide

<400> 2

Cys Leu Asn Ala His Arg Thr Thr His His His Cys
1 5 10

<210> 3

<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 3
Cys His Gly Leu His Ser Asn Met Arg His Cys
1 5 10

<210> 4
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 4
Cys His His His Arg Leu Asn Cys
1 5

<210> 5
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 5
Cys His Ser His His Arg Gly Cys
1 5

<210> 6
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 6
Cys Trp Asp His His Asn His His Cys
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<210> 7
<211> 9

<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 7
Cys Asp Asn Asn His His His His Cys
1 5

<210> 8
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 8
Cys His His His Arg Ile Ser Ser His Cys
1 5 10

<210> 9
<211> 1269
<212> DNA
<213> Vesicular stomatitis virus

<400> 9
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tacatcaata ctacaaaaag tttgtcagat ctaagaggat atgtctaccat aggccctcaaa 180
tccggaaatg tatcaatcat acatgtcaac agctacttgt atggagcatt aaaggacatc 240
cggggtaagt tggataaaaga ttggtaagt ttcggaaataa acatcgggaa agcaggggat 300
acaatcgaa tatttgacct tgcatttcgtt aaagccctgg acggcgtact tccagatgg 360
gtatcggatg cttccagaac cagcgcagat gacaaatggt tgcctttgtt tctacttggc 420
ttatacagag tggcagaac acaaattgcct gaatacagaa aaaagctcat ggatgggctg 480
acaatcaat gcaaaatgtat caatgaacag tttgaacccctt ttgtgccaga aggtcgatg 540
atttttgatg tggggggaaa tgacagtaat tacacaaaaaa ttgtcgctgc agtggacatg 600
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tctacagaag atgtAACGAC ctggatcttgg aaccggaaatg ttgcagatgaa aatggccaa 780
atgtatgccttc caggccaaaga aattgacaag gccgattcat acatgccttta tttgatcgac 840
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gacattgagt atacatctct tactacagca gttttgtgtt acgttatgc agtaggatcc 1020
tctggccact tggcacaaca gttttgtgtt ggagataaca aatacactcc agatgatagt 1080
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tggtttgcac atcaaaaacag aaaaccgact cctgatatgatc tgcagttatgc gaaaagagca 1200
gtcatgtcac tgcaaggcct aagagagaag acaattggca agttagctaa gtcagaattt 1260
gacaaaatgaa 1269

<210> 10

<211> 1269
<212> DNA
<213> Vesicular stomatitis virus

<400> 10

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tacatcaata ctacaaaaag tttgtcagat ctaagaggat atgtctacc aaggcctcaaa 180
tccggaaatg tatcaatcat acatgtcaac agctacttgt atggagcatt gaaggacatc 240
cgggtaagt tggataaaga ttggtaagt ttccgaaataa acatcgaa ggcagggat 300
acaatcgaa tatttgacct tgtatcctt aaagccctgg acgggttact tccagatgga 360
gtatcgatg cttccagaac cagcgcagat gacaaatggt tgccttgc tctacttggc 420
ttatacagag tggcagaac acaaattgcct gaatacagaa aaaggctcat ggatgggctg 480
acaatcaat gcaaaatgtat caatgaacag tttgaaccc ttgtgccaga aggtcgtgac 540
attttgatg tggggaaa tgacagtaat tacacaaaaa ttgtcgctgc agtggacatg 600
ttcttccaca tggtaaaaaa acatgaatgt gcctcgatc gatacggaa tattgtttcc 660
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tctacagaag atgtaacgac ctggatctt aaccgagaag ttgcagatga gatggtccaa 780
atgtatcctt caggccaaga aattgacaag gccgattcat acatgcctt tttgatcgac 840
tttggattgt cttctaagtc tccatattct tccgtcaaaa accctgcctt ccacttctgg 900
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gacattgagt atacatctt tactacagca gttttgtt acgcttatgc agtaggatcc 1020
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tggtttgaag atcaaaacag aaaaccgact cctgatatga tgcagtatgc gaaacgagca 1200
gtcatgtcac tgcaaggcct aagagagaag acaattggca agtatgctaa gtcagaattt 1260
gacaaatga 1269

<210> 11
<211> 1269
<212> DNA
<213> Vesicular stomatitis virus

<400> 11

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tacatcaata ctacaaaaag tttgtcagat ctaagaggat atgtctacc aaggcctcaaa 180
tccggaaatg tatcaatcat acatgtcaac agctacttgt atggagcatt gaaggacatc 240
cgggtaagt tggataaaga ttggtaagt ttccgaaataa acatcgaa ggcagggat 300
acaatcgaa tatttgacct tgtatcctt aaagccctgg acgggttact tccagatgga 360
gtatcgatg cttccagaac cagcgcagat gacaaatggt tgccttgc tctacttggc 420
ttatacagag tggcagaac acaaattgcct gaatacagaa aaaggctcat ggatgggctg 480
acaatcaat gcaaaatgtat caatgaacag tttgaaccc ttgtgccaga aggtcgtgac 540
attttgatg tggggaaa tgacagtaat tacacaaaaa ttgtcgctgc agtggacatg 600
ttcttccaca tggtaaaaaa acatgaatgt gcctcgatc gatacggaa tattgtttcc 660
agattcaaaatg attgtgctgc attggcaaca tttggacacc tctgcggaaat aaccggaaatg 720
tctacagaag atgtaacgac ctggatctt aaccgagaag ttgcagatga gatggtccaa 780
atgtatcctt caggccaaga aattgacaag gccgattcat acatgcctt tttgatcgac 840
tttggattgt cttctaagtc tccatattct tccgtcaaaa accctgcctt ccacttctgg 900
ggcaattga cagctttct gctcagatcc accagagcaa ggaatgccc acagcctgat 960
gacattgagt atacatctt tactacagca gttttgtt acgcttatgc agtaggatcc 1020
tctgctgact tggcacaaca gttttgtt ggagatagca aatacactcc agatgatagt 1080
accggaggat tgacgactaa tgccaccgcca caaggcagag atgtggtcga atggctcgga 1140
tggtttgaag atcaaaacag aaaaccgact cctgatatga tgcagtatgc gaaacgagca 1200
gtcatgtcac tgcaaggcct aagagagaag acaattggca agtatgctaa gtcagaattt 1260
gacaaatga 1269

<210> 12
<211> 1269
<212> DNA
<213> Vesicular stomatitis virus

<400> 12
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aataggatc cagtggataa cccggcagat tacttcagaa aatcaaaggaa gattcctctt 120
tacatcaata ctacaaaaaaatg tttgtcagat ctaagaggat atgtctaccat aggcctcaaa 180
tccggaaatg tatcaatcat acatgtcaac agctacttgt atggagcatt gaaggacatc 240
cggggtaagt tggataaaaga ttggtcaagt ttgcggataaa acatcgggaa ggcaggggat 300
acaatcgaa tatttgacat tttatccttgg aaagccctgg acgggttact tccagatggaa 360
gtatcgatc cttccagaac cagcgcagat gacaaatggt tgccttgc tctacttggc 420
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acaatcaat gaaaaatgtat caatgaacag tttgaacctc ttgtgccaga aggtcgtgac 540
attttgatc tttggggaaa tgacagtaat tacacaaaaaa ttgtcgctgc agtggacatg 600
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gtcatgtcac tgcaaggcct aagagagaag acaattggca agtatacgtaa gtcagaattt 1260
gacaaatga 1269

<210> 13
<211> 1029
<212> DNA
<213> Vesicular stomatitis virus

<220>
<221> modified_base
<222> (1)..(1029)
<223> "n" represents a, t, c, g, other or unknown

<400> 13
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gataaagatt ggtcaagttt cgaaataaaac atcgggaagg caggggatac aatcggaata 120
tttgaccttgc tatccttgaa agccctggac ggtgtacttc cagatggagt atcggatgct 180
tccagaaccca ggcgcagatga caaatggttt cctttgtatc tacttggctt atacagagt 240
ggcagaacac aaatgcctga atacagaaaaa aggctcatgg atgggctgac aaatcaatgc 300
aaaatgatca atgaacagtt tgaaccttgc tggccagaag gtcgtgacat tttgatgtg 360
tggggaaatg acagtaatta cacaaaaaatt gtcgtgcag tggacatgtt cttccacatg 420
ttcaaaaaac atgaatgtgc ctcgttgcatac tacggaaacta ttgtttccag attcaaagat 480
tgtgctgcat tggcaacatt tggacacccctc tgcaaaaataa cggaaatgtc tacagaagat 540
gtaaagcactt ggatcttgaa ccgagaagtt gcagatgaga tggtccaaat gatgcttcca 600
ggccaagaaa ttgacaaggc cgattcatac atgccttatt tgatcgactt tggattgtct 660
tctaagtctc catattcttc cgtcaaaaac cctgccttcc acttctgggg gcaattgact 720
gacatttgatc atacatctcn tactacagca ggtttgttgc acgcttatgc agtaggatcc 780
tctgctgact tggcacanca gttttgttgc ggagatagca aatacactcc agatgatagt 840

accggaggat tgacgactaa tgcaccgcca caaggcagag atgtggtcga atggctcgga 900
tggtttgaag atcaaaaacag aaaaccgact cctgatatga tgcagtatgc gaaacgagca 960
gtcatgtcac tgcaaggcct aagagagaag acaattggca agtatgctaa gtcagaattt 1020
gacaatata 1029

<210> 14
<211> 422
<212> PRT
<213> Vesicular stomatitis virus

<400> 14
Met Ser Val Thr Val Lys Arg Ile Ile Asp Asn Thr Val Ile Val Pro
1 5 10 15

Lys Leu Pro Ala Asn Glu Asp Pro Val Glu Tyr Pro Ala Asp Tyr Phe
20 25 30

Arg Lys Ser Lys Glu Ile Pro Leu Tyr Ile Asn Thr Thr Lys Ser Leu
35 40 45

Ser Asp Leu Arg Gly Tyr Val Tyr Gln Gly Leu Lys Ser Gly Asn Val
50 55 60

Ser Ile Ile His Val Asn Ser Tyr Leu Tyr Gly Ala Leu Lys Asp Ile
65 70 75 80

Arg Gly Lys Leu Asp Lys Asp Trp Ser Ser Phe Gly Ile Asn Ile Gly
85 90 95

Lys Ala Gly Asp Thr Ile Gly Ile Phe Asp Leu Val Ser Leu Lys Ala
100 105 110

Leu Asp Gly Val Leu Pro Asp Gly Val Ser Asp Ala Ser Arg Thr Ser
115 120 125

Ala Asp Asp Lys Trp Leu Pro Leu Tyr Leu Leu Gly Leu Tyr Arg Val
130 135 140

Gly Arg Thr Gln Met Pro Glu Tyr Arg Lys Lys Leu Met Asp Gly Leu
145 150 155 160

Thr Asn Gln Cys Lys Met Ile Asn Glu Gln Phe Glu Pro Leu Val Pro
165 170 175

Glu Gly Arg Asp Ile Phe Asp Val Trp Gly Asn Asp Ser Asn Tyr Thr
180 185 190

Lys Ile Val Ala Ala Val Asp Met Phe Phe His Met Phe Lys Lys His
195 200 205

Glu Cys Ala Ser Phe Arg Tyr Gly Thr Ile Val Ser Arg Phe Lys Asp
210 215 220

Cys Ala Ala Leu Ala Thr Phe Gly His Leu Cys Lys Ile Thr Gly Met
225 230 235 240

Ser Thr Glu Asp Val Thr Thr Trp Ile Leu Asn Arg Glu Val Ala Asp
245 250 255

Glu Met Val Gln Met Met Leu Pro Gly Gln Glu Ile Asp Lys Ala Asp
260 265 270

Ser Tyr Met Pro Tyr Leu Ile Asp Phe Gly Leu Ser Ser Lys Ser Pro
275 280 285

Tyr Ser Ser Val Lys Asn Pro Ala Phe His Phe Trp Gly Gln Leu Thr
290 295 300

Ala Leu Leu Leu Arg Ser Thr Arg Ala Arg Asn Ala Arg Gln Pro Asp
305 310 315 320

Asp Ile Glu Tyr Thr Ser Leu Thr Thr Ala Gly Leu Leu Tyr Ala Tyr
325 330 335

Ala Val Gly Ser Ser Ala Asp Leu Ala Gln Gln Phe Cys Val Gly Asp
340 345 350

Asn Lys Tyr Thr Pro Asp Asp Ser Thr Gly Gly Leu Thr Thr Asn Ala
355 360 365

Pro Pro Gln Gly Arg Asp Val Val Glu Trp Leu Gly Trp Phe Glu Asp
370 375 380

Gln Asn Arg Lys Pro Thr Pro Asp Met Met Gln Tyr Ala Lys Arg Ala
385 390 395 400

Val Met Ser Leu Gln Gly Leu Arg Glu Lys Thr Ile Gly Lys Tyr Ala
405 410 415

Lys Ser Glu Phe Asp Lys
420

<210> 15
<211> 422
<212> PRT
<213> Vesicular stomatitis virus

<400> 15
Met Ser Val Thr Val Lys Arg Ile Ile Ala Asn Thr Val Ile Val Pro
1 5 10 15

Lys Leu Pro Ala Asn Glu Asp Pro Val Glu Tyr Pro Ala Asp Tyr Phe
20 25 30

Arg Lys Ser Lys Glu Ile Pro Leu Tyr Ile Asn Thr Thr Lys Ser Leu
35 40 45

Ser Asp Leu Arg Gly Tyr Val Tyr Gln Gly Leu Lys Ser Gly Asn Val
50 55 60

Ser Ile Ile His Val Asn Ser Tyr Leu Tyr Gly Ala Leu Lys Asp Ile
65 70 75 80

Arg Gly Lys Leu Asp Lys Asp Trp Ser Ser Phe Gly Ile Asn Ile Gly
85 90 95

Lys Ala Gly Asp Thr Ile Gly Ile Phe Asp Leu Val Ser Leu Lys Ala
100 105 110

Leu Asp Gly Val Leu Pro Asp Gly Val Ser Asp Ala Ser Arg Thr Ser
115 120 125

Ala Asp Asp Lys Trp Leu Pro Leu Tyr Leu Leu Gly Leu Tyr Arg Val
130 135 140

Gly Arg Thr Gln Met Pro Glu Tyr Arg Lys Arg Leu Met Asp Gly Leu
145 150 155 160

Thr Asn Gln Cys Lys Met Ile Asn Glu Gln Phe Glu Pro Leu Val Pro
165 170 175

Glu Gly Arg Asp Ile Phe Asp Val Trp Gly Asn Asp Ser Asn Tyr Thr
180 185 190

Lys Ile Val Ala Ala Val Asp Met Phe Phe His Met Phe Lys Lys His
195 200 205

Glu Cys Ala Ser Phe Arg Tyr Gly Thr Ile Val Ser Arg Phe Lys Asp
210 215 220

Cys Ala Ala Leu Ala Thr Phe Gly His Leu Cys Lys Ile Thr Gly Met
225 230 235 240

Ser Thr Glu Asp Val Thr Thr Trp Ile Leu Asn Arg Glu Val Ala Asp
245 250 255

Glu Met Val Gln Met Met Leu Pro Gly Gln Glu Ile Asp Lys Ala Asp
260 265 270

Ser Tyr Met Pro Tyr Leu Ile Asp Phe Gly Leu Ser Ser Lys Ser Pro
275 280 285

Tyr Ser Ser Val Lys Asn Pro Ala Phe His Phe Trp Gly Gln Leu Thr
290 295 300

Ala Leu Leu Leu Arg Ser Thr Arg Ala Arg Asn Ala Arg Gln Pro Asp
305 310 315 320

Asp Ile Glu Tyr Thr Ser Leu Thr Thr Ala Gly Leu Leu Tyr Ala Tyr
325 330 335

Ala Val Gly Ser Ser Ala Asp Leu Ala Gln Gln Phe Cys Val Gly Asp
340 345 350

Ser Lys Tyr Thr Pro Asp Asp Ser Thr Gly Gly Leu Thr Thr Asn Ala
355 360 365

Pro Pro Gln Gly Arg Asp Val Val Glu Trp Leu Gly Trp Phe Glu Asp
370 375 380

Gln Asn Arg Lys Pro Thr Pro Asp Met Met Gln Tyr Ala Lys Arg Ala
385 390 395 400
Val Met Ser Leu Gln Gly Leu Arg Glu Lys Thr Ile Gly Lys Tyr Ala
405 410 415
Lys Ser Glu Phe Asp Lys
420

<210> 16
<211> 422
<212> PRT
<213> Vesicular stomatitis virus

<400> 16
Met Ser Val Thr Val Lys Arg Ile Ile Asp Asn Thr Val Ile Val Pro
1 5 10 15
Lys Leu Pro Ala Asn Glu Asp Pro Val Glu Tyr Pro Ala Asp Tyr Phe
20 25 30
Arg Lys Ser Lys Glu Ile Pro Leu Tyr Ile Asn Thr Thr Lys Ser Leu
35 40 45
Ser Asp Leu Arg Gly Tyr Val Tyr Gln Gly Leu Lys Ser Gly Asn Val
50 55 60
Ser Ile Ile His Val Asn Ser Tyr Leu Tyr Gly Ala Leu Lys Asp Ile
65 70 75 80
Arg Gly Lys Leu Asp Lys Asp Trp Ser Ser Phe Gly Ile Asn Ile Gly
85 90 95
Lys Ala Gly Asp Thr Ile Gly Ile Phe Asp Leu Val Ser Leu Lys Ala
100 105 110
Leu Asp Gly Val Leu Pro Asp Gly Val Ser Asp Ala Ser Arg Thr Ser
115 120 125
Ala Asp Asp Lys Trp Leu Pro Leu Tyr Leu Leu Gly Leu Tyr Arg Val
130 135 140
Gly Arg Thr Gln Met Pro Glu Tyr Arg Lys Arg Leu Met Asp Gly Leu
145 150 155 160
Thr Asn Gln Cys Lys Met Ile Asn Glu Gln Phe Glu Pro Leu Val Pro
165 170 175
Glu Gly Arg Asp Ile Phe Asp Val Trp Gly Asn Asp Ser Asn Tyr Thr
180 185 190
Lys Ile Val Ala Ala Val Asp Met Phe Phe His Met Phe Lys Lys His
195 200 205
Glu Cys Ala Ser Phe Arg Tyr Gly Thr Ile Val Ser Arg Phe Lys Asp

210	215	220	
Cys Ala Ala Leu Ala Thr Phe Gly His Leu Cys Lys Ile Thr Gly Met			
225	230	235	240
Ser Thr Glu Asp Val Thr Thr Trp Ile Leu Asn Arg Glu Val Ala Asp			
245	250	255	
Glu Met Val Gln Met Met Leu Pro Gly Gln Glu Ile Asp Lys Ala Asp			
260	265	270	
Ser Tyr Met Pro Tyr Leu Ile Asp Phe Gly Leu Ser Ser Lys Ser Pro			
275	280	285	
Tyr Ser Ser Val Lys Asn Pro Ala Phe His Phe Trp Gly Gln Leu Thr			
290	295	300	
Ala Leu Leu Leu Arg Ser Thr Arg Ala Arg Asn Ala Arg Gln Pro Asp			
305	310	315	320
Asp Ile Glu Tyr Thr Ser Leu Thr Thr Ala Gly Leu Leu Tyr Ala Tyr			
325	330	335	
Ala Val Gly Ser Ser Ala Asp Leu Ala Gln Gln Phe Cys Val Gly Asp			
340	345	350	
Ser Lys Tyr Thr Pro Asp Asp Ser Thr Gly Gly Leu Thr Thr Asn Ala			
355	360	365	
Pro Pro Gln Gly Arg Asp Val Val Glu Trp Leu Gly Trp Phe Glu Asp			
370	375	380	
Gln Asn Arg Lys Pro Thr Pro Asp Met Met Gln Tyr Ala Lys Arg Ala			
385	390	395	400
Val Met Ser Leu Gln Gly Leu Arg Glu Lys Thr Ile Gly Lys Tyr Ala			
405	410	415	
Lys Ser Glu Phe Asp Lys			
420			

<210> 17
 <211> 342
 <212> PRT
 <213> Vesicular stomatitis virus

 <220>
 <221> MOD_RES
 <222> (1)..(342)
 <223> "Xaa" represents any, other or unknown amino acid

<400> 17
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 1 5 10 15

 Arg Gly Lys Leu Asp Lys Asp Trp Ser Ser Phe Gly Ile Asn Ile Gly

20 25 30
Lys Ala Gly Asp Thr Ile Gly Ile Phe Asp Leu Val Ser Leu Lys Ala
35 40 45
Leu Asp Gly Val Leu Pro Asp Gly Val Ser Asp Ala Ser Arg Thr Ser
50 55 60
Ala Asp Asp Lys Trp Leu Pro Leu Tyr Leu Leu Gly Leu Tyr Arg Val
65 70 75 80
Gly Arg Thr Gln Met Pro Glu Tyr Arg Lys Arg Leu Met Asp Gly Leu
85 90 95
Thr Asn Gln Cys Lys Met Ile Asn Glu Gln Phe Glu Pro Leu Val Pro
100 105 110
Glu Gly Arg Asp Ile Phe Asp Val Trp Gly Asn Asp Ser Asn Tyr Thr
115 120 125
Lys Ile Val Ala Ala Val Asp Met Phe Phe His Met Phe Lys Lys His
130 135 140
Glu Cys Ala Ser Phe Arg Tyr Gly Thr Ile Val Ser Arg Phe Lys Asp
145 150 155 160
Cys Ala Ala Leu Ala Thr Phe Gly His Leu Cys Lys Ile Thr Gly Met
165 170 175
Ser Thr Glu Asp Val Thr Thr Trp Ile Leu Asn Arg Glu Val Ala Asp
180 185 190
Glu Met Val Gln Met Met Leu Pro Gly Gln Glu Ile Asp Lys Ala Asp
195 200 205
Ser Tyr Met Pro Tyr Leu Ile Asp Phe Gly Leu Ser Ser Lys Ser Pro
210 215 220
Tyr Ser Ser Val Lys Asn Pro Ala Phe His Phe Trp Gly Gln Leu Thr
225 230 235 240
Asp Ile Glu Tyr Thr Ser Xaa Thr Thr Ala Gly Leu Leu Tyr Ala Tyr
245 250 255
Ala Val Gly Ser Ser Ala Asp Leu Ala Xaa Gln Phe Cys Val Gly Asp
260 265 270
Ser Lys Tyr Thr Pro Asp Asp Ser Thr Gly Gly Leu Thr Thr Asn Ala
275 280 285
Pro Pro Gln Gly Arg Asp Val Val Glu Trp Leu Gly Trp Phe Glu Asp
290 295 300
Gln Asn Arg Lys Pro Thr Pro Asp Met Met Gln Tyr Ala Lys Arg Ala
305 310 315 320
Val Met Ser Leu Gln Gly Leu Arg Glu Lys Thr Ile Gly Lys Tyr Ala

325

330

335

Lys Ser Glu Phe Asp Lys
340

<210> 18
<211> 798
<212> DNA
<213> Vesicular stomatitis virus

<400> 18
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caagaggatg gagtgaaaga gcatactaag ccctcttattttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggttt tgatgcaca ggatccagaa 240
gctgagcaag ttgaaggctt tatacagggg ccttagatg actatgcaga tgaggaagt 300
gatgttgtat ttacttcgga ctggaaacca cctgagcttgaatctgacgacatggaaag 360
accttacggt tgacatcgcc agagggtta agtggagagc agaaatcccgtggctttcg 420
acgattaaag cagtcgtgca aagtgcacaa tactgaaatc tggcagatgtcacattgaa 480
gcacgggag aagggtcat tatgaaggag cgccagataa ctcggatgtatataaggc 540
actccagtga tgaacacaca tccgtcccaa tcagaagccgatcagatgtttgtctc 600
tcaaagacat ccatgactttt ccaacccaaag aaagcaagtc ttcagccttccaccatatcc 660
ttggatgaat tttctcatc tagaggagat ttcatctctgtcgaggtgacggacgaaatg 720
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gtcaaataatttcgttag 798

<210> 19
<211> 798
<212> DNA
<213> Vesicular stomatitis virus

<400> 19
atggataatc tcacaaaagt tcgtgagttt ctcaagtccatttcgtcttggatcaggcg 60
gtaggagaga tagatgagat cgaagcacaa cgagctgaaa agtccaattttgatgtttc 120
caagaggacg gagtgaaaga gcatactagg ccctcttattttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggctt tgatgtacc agatccggaa 240
gctgagcaag ttgaaggctt tatacagggg ccttagatg actatgcggatggacgtg 300
gatgttgtat ttacttcgga ctggaaacag cctgagcttgaatccgacgacatggaaag 360
accttacggt tgacattgccc agagggtta agtggagagc agaaatcccgtggctttcg 420
acgattaaag cagtcgttca aagtgcacaa tactgaaatc tggcagatgtcacattgaa 480
gcacgggag aagggtcat cataaaaaag cgccagataa ctcggatgtatataaggc 540
actccagtga tgaacacaca tccgtcccaa tcagaagccgatcagatgtttgtctc 600
tcaaagacat ccatgactttt ccaacccaaag aaagcaagtc ttcagccttccaccatatcc 660
ttggatgaat tttctcatc tagaggagaa ttcatctctgtcgaggtaaatcaggcgaga 720
tctataaaggccatcct gctcggtctg aggtacaaaa agttgtacaaatcaggcgaga 780
gtcaaataatttcgttag 798

<210> 20
<211> 570
<212> DNA
<213> Vesicular stomatitis virus

<400> 20
atggataatc tcacaaaagt tcgtgagttt ctcaagtccatttcgtcttggatcaggcg 60

gtaggagaga tagatgagat cgaagcacaa cgagctgaaa agtccaatta tgagttttc 120
caagaggacg gagtgaaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggct tttatgtacc agatccggaa 240
gctgagcaag ttgaaggctt tatacagggg ccttagatg actatgcggta tgaggacgtg 300
gatgttgtat tcacttcgga ctggaaacag cctgagctt aatccgacgac gcatggaaag 360
accttacggt tgacattgcc agagggttta agtggagagc agaaatccca gtggctttt 420
acgattaaag cagtcgttca aagtgc当地 cactgaaatc tggcagagtg cacattgaa 480
gcatcgggag aagggttcat cataaaaaag cgccagataa ctccggatgt atataaggc 540
actccagtga tgaacacaca tccgtcccaa tcggaaagccg tatcagatgt ttggctctc 600
tcaaagacat ccatgactt ccaacccaaag aaagcaagtc ttcagcctct caccatatcc 660
ttggatgaat tttctcatc tagaggagaa ttcatctctg tcggaggtaa cggacgaaatg 720
tctataaaag aggccatcct gctcggtctg aggtacaaaa agttgtacaa tcaggcgaga 780
gtcaaataatt ctctgttag 798

<210> 21
<211> 798
<212> DNA
<213> Vesicular stomatitis virus

<400> 21
atggataatc tcacaaaagt tcgtgagtat ctcaagtcct atttcgtct agatcaggcg 60
gtaggagaga tagatgagat cgaagcacaa cgagctgaaa agtccaatta tgagttttc 120
caagaggacg gagtgaaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggct tttatgtacc agatccggaa 240
gctgagcaag ttgaaggctt tatacagggg ccttagatg actatgcggta tgaggacgtg 300
gatgttgtat tcacttcgga ctggaaacag cctgagctt aatccgacgac gcatggaaag 360
accttacggt tgacattgcc agagggttta agtggagagc agaaatccca gtggctttt 420
acgattaaag cagtcgttca aagtgc当地 cactgaaatc tggcagagtg cacattgaa 480
gcatcgggag aagggttcat cataaaaaag cgccagataa ctccggatgt atataaggc 540
actccagtga tgaacacaca tccgtcccaa tcggaaagccg tatcagatgt ttggctctc 600
tcaaagacat ccatgactt ccaacccaaag aaagcaagtc ttcagcctct caccatatcc 660
ttggatgaat tttctcatc tagaggagaa ttcatctctg tcggaggtaa cggacgaaatg 720
tctataaaag aggccatcct gctcggtctg aggtacaaaa agttgtacaa tcaggcgaga 780
gtcaaataatt ctctgttag 798

<210> 22
<211> 798
<212> DNA
<213> Vesicular stomatitis virus

<400> 22
atggataatc tcacaaaagt tcgtgagtat ctcaagtcct atttcgtct agatcaggcg 60
gtaggagaga tagatgagat cgaagcacaa cgagctgaaa agtccaatta tgagttttc 120
caagaggacg gagtgaaaga gcatactagg ccctcttatt ttcaggcagc agatgattct 180
gacacagaat ctgaaccaga aattgaagac aatcaaggct tttatgtacc agatccggaa 240
gctgagcaag ttgaaggctt tatacagggg ccttagatg actatgcggta tgaggacgtg 300
gatgttgtat tcacttcgga ctggaaacag cctgagctt aatccgacgac gcatggaaag 360
accttacggt tgacattgcc agagggttta agtggagagc agaaatccca gtggctttt 420
acgattaaag cagtcgttca aagtgc当地 cactgaaatc tggcagagtg cacattgaa 480
gcatcgggag aagggttcat cataaaaaag cgccagataa ctccggatgt atataaggc 540
actccagtga tgaacacaca tccgtcccaa tcggaaagccg tatcagatgt ttggctctc 600
tcaaagacat ccatgactt ccaacccaaag aaagcaagtc ttcagcctct caccatatcc 660
ttggatgaat tttctcatc tagaggagaa ttcatctctg tcggaggtaa cggacgaaatg 720
tctataaaag aggccatcct gctcggtctg aggtacaaaa agttgtacaa tcaggcgaga 780
gtcaaataatt ctctgttag 798

<210> 23
<211> 265

<212> PRT

<213> Vesicular stomatitis virus

<400> 23

Met Asp Asn Leu Thr Lys Val Arg Glu Tyr Leu Lys Ser Tyr Ser Arg
1 5 10 15

Leu Asp Gln Ala Val Gly Glu Ile Asp Glu Ile Glu Ala Gln Arg Ala
20 25 30

Glu Lys Ser Asn Tyr Glu Leu Phe Gln Glu Asp Gly Val Glu Glu His
35 40 45

Thr Lys Pro Ser Tyr Phe Gln Ala Ala Asp Asp Ser Asp Thr Glu Ser
50 55 60

Glu Pro Glu Ile Glu Asp Asn Gln Gly Leu Tyr Ala Gln Asp Pro Glu
65 70 75 80

Ala Glu Gln Val Glu Gly Phe Ile Gln Gly Pro Leu Asp Asp Tyr Ala
85 90 95

Asp Glu Glu Val Asp Val Val Phe Thr Ser Asp Trp Lys Pro Pro Glu
100 105 110

Leu Glu Ser Asp Glu His Gly Lys Thr Leu Arg Leu Thr Ser Pro Glu
115 120 125

Gly Leu Ser Gly Glu Gln Lys Ser Gln Trp Leu Ser Thr Ile Lys Ala
130 135 140

Val Val Gln Ser Ala Lys Tyr Trp Asn Leu Ala Glu Cys Thr Phe Glu
145 150 155 160

Ala Ser Gly Glu Gly Val Ile Met Lys Glu Arg Gln Ile Thr Pro Asp
165 170 175

Val Tyr Lys Val Thr Pro Val Met Asn Thr His Pro Ser Gln Ser Glu
180 185 190

Ala Val Ser Asp Val Trp Ser Leu Ser Lys Thr Ser Met Thr Phe Gln
195 200 205

Pro Lys Lys Ala Ser Leu Gln Pro Leu Thr Ile Ser Leu Asp Glu Leu
210 215 220

Phe Ser Ser Arg Gly Glu Phe Ile Ser Val Gly Gly Asp Gly Arg Met
225 230 235 240

Ser His Lys Glu Ala Ile Leu Leu Gly Leu Arg Tyr Lys Lys Leu Tyr
245 250 255

Asn Gln Ala Arg Val Lys Tyr Ser Leu
260 265

<210> 24

<211> 265

<212> PRT

<213> Vesicular stomatitis virus

<400> 24

Met Asp Asn Leu Thr Lys Val Arg Glu Tyr Leu Lys Ser Tyr Ser Arg
1 5 10 15

Leu Asp Gln Ala Val Gly Glu Ile Asp Glu Ile Glu Ala Gln Arg Ala
20 25 30

Glu Lys Ser Asn Tyr Glu Leu Phe Gln Glu Asp Gly Val Glu Glu His
35 40 45

Thr Arg Pro Ser Tyr Phe Gln Ala Ala Asp Asp Ser Asp Thr Glu Ser
50 55 60

Glu Pro Glu Ile Glu Asp Asn Gln Gly Leu Tyr Val Pro Asp Pro Glu
65 70 75 80

Ala Glu Gln Val Glu Gly Phe Ile Gln Gly Pro Leu Asp Asp Tyr Ala
85 90 95

Asp Glu Asp Val Asp Val Val Phe Thr Ser Asp Trp Lys Gln Pro Glu
100 105 110

Leu Glu Ser Asp Glu His Gly Lys Thr Leu Arg Leu Thr Leu Pro Glu
115 120 125

Gly Leu Ser Gly Glu Gln Lys Ser Gln Trp Leu Leu Thr Ile Lys Ala
130 135 140

Val Val Gln Ser Ala Lys His Trp Asn Leu Ala Glu Cys Thr Phe Glu
145 150 155 160

Ala Ser Gly Glu Gly Val Ile Ile Lys Lys Arg Gln Ile Thr Pro Asp
165 170 175

Val Tyr Lys Val Thr Pro Val Met Asn Thr His Pro Ser Gln Ser Glu
180 185 190

Ala Val Ser Asp Val Trp Ser Leu Ser Lys Thr Ser Met Thr Phe Gln
195 200 205

Pro Lys Lys Ala Ser Leu Gln Pro Leu Thr Ile Ser Leu Asp Glu Leu
210 215 220

Phe Ser Ser Arg Gly Glu Phe Ile Ser Val Gly Gly Asn Gly Arg Met
225 230 235 240

Ser His Lys Glu Ala Ile Leu Leu Gly Leu Arg Tyr Lys Lys Leu Tyr
245 250 255

Asn Gln Ala Arg Val Lys Tyr Ser Leu
260 265

<210> 25
<211> 190
<212> PRT
<213> Vesicular stomatitis virus

<400> 25
Met Asp Asn Leu Thr Lys Val Arg Glu Tyr Leu Lys Ser Tyr Ser Arg
1 5 10 15

Leu Asp Gln Ala Val Gly Glu Ile Asp Glu Ile Glu Ala Gln Arg Ala
20 25 30

Glu Lys Ser Asn Tyr Glu Leu Phe Gln Glu Asp Gly Val Glu Glu His
35 40 45

Thr Arg Pro Ser Tyr Phe Gln Ala Ala Asp Asp Ser Asp Thr Glu Ser
50 55 60

Glu Pro Glu Ile Glu Asp Asn Gln Gly Leu Tyr Val Pro Asp Pro Glu
65 70 75 80

Ala Glu Gln Val Glu Gly Phe Ile Gln Gly Pro Leu Asp Asp Tyr Ala
85 90 95

Asp Glu Asp Val Asp Val Val Phe Thr Ser Asp Trp Lys Gln Pro Glu
100 105 110

Leu Glu Ser Asp Glu His Gly Lys Thr Leu Arg Leu Thr Leu Pro Glu
115 120 125

Gly Leu Ser Gly Glu Gln Lys Ser Gln Trp Leu Leu Thr Ile Lys Ala
130 135 140

Val Val Gln Ser Ala Lys His Trp Asn Leu Ala Glu Cys Thr Phe Glu
145 150 155 160

Ala Ser Gly Glu Gly Val Ile Ile Lys Lys Arg Gln Ile Thr Pro Asp
165 170 175

Val Tyr Lys Val Thr Pro Val Met Asn Thr His Pro Ser Gln
180 185 190

<210> 26
<211> 265
<212> PRT
<213> Vesicular stomatitis virus

<400> 26
Met Asp Asn Leu Thr Lys Val Arg Glu Tyr Leu Lys Ser Tyr Ser Arg
1 5 10 15

Leu Asp Gln Ala Val Gly Glu Ile Asp Glu Ile Glu Ala Gln Arg Ala
20 25 30

Glu Lys Ser Asn Tyr Glu Leu Phe Gln Glu Asp Gly Val Glu Glu His
35 40 45

Thr Arg Pro Ser Tyr Phe Gln Ala Ala Asp Asp Ser Asp Thr Glu Ser
50 55 60

Glu Pro Glu Ile Glu Asp Asn Gln Gly Leu Tyr Val Pro Asp Pro Glu
65 70 75 80

Ala Glu Gln Val Glu Gly Phe Ile Gln Gly Pro Leu Asp Asp Tyr Ala
85 90 95

Asp Glu Asp Val Asp Val Val Phe Thr Ser Asp Trp Lys Gln Pro Glu
100 105 110

Leu Glu Ser Asp Glu His Gly Lys Thr Leu Arg Leu Thr Leu Pro Glu
115 120 125

Gly Leu Ser Gly Glu Gln Lys Ser Gln Trp Leu Leu Thr Ile Lys Ala
130 135 140

Val Val Gln Ser Ala Lys His Trp Asn Leu Ala Glu Cys Thr Phe Glu
145 150 155 160

Ala Ser Gly Glu Gly Val Ile Ile Lys Lys Arg Gln Ile Thr Pro Asp
165 170 175

Val Tyr Lys Val Thr Pro Val Met Asn Thr His Pro Ser Gln Ser Glu
180 185 190

Ala Val Ser Asp Val Trp Ser Leu Ser Lys Thr Ser Met Thr Phe Gln
195 200 205

Pro Lys Lys Ala Ser Leu Gln Pro Leu Thr Ile Ser Leu Asp Glu Leu
210 215 220

Phe Ser Ser Arg Gly Glu Phe Ile Ser Val Gly Gly Asn Gly Arg Met
225 230 235 240

Ser His Lys Glu Ala Ile Leu Leu Gly Leu Arg Tyr Lys Lys Leu Tyr
245 250 255

Asn Gln Ala Arg Val Lys Tyr Ser Leu
260 265

<210> 27

<211> 265

<212> PRT

<213> Vesicular stomatitis virus

<400> 27

Met Asp Asn Leu Thr Lys Val Arg Glu Tyr Leu Lys Ser Tyr Ser Arg
1 5 10 15

Leu Asp Gln Ala Val Gly Glu Ile Asp Glu Ile Glu Ala Gln Arg Ala
20 25 30

Glu Lys Ser Asn Tyr Glu Leu Phe Gln Glu Asp Gly Val Glu Glu His

35

40

45

Thr Arg Pro Ser Tyr Phe Gln Ala Ala Asp Asp Ser Asp Thr Glu Ser
 50 55 60

Glu Pro Glu Ile Glu Asp Asn Gln Gly Leu Tyr Val Pro Asp Pro Glu
 65 70 75 80

Ala Glu Gln Val Glu Gly Phe Ile Gln Gly Pro Leu Asp Asp Tyr Ala
 85 90 95

Asp Glu Asp Val Asp Val Val Phe Thr Ser Asp Trp Lys Gln Pro Glu
 100 105 110

Leu Glu Ser Asp Glu His Gly Lys Thr Leu Arg Leu Thr Leu Pro Glu
 115 120 125

Gly Leu Ser Gly Glu Gln Lys Ser Gln Trp Leu Leu Thr Ile Lys Ala
 130 135 140

Val Val Gln Ser Ala Lys His Trp Asn Leu Ala Glu Cys Thr Phe Glu
 145 150 155 160

Ala Ser Gly Glu Gly Val Ile Ile Lys Lys Arg Gln Ile Thr Pro Asp
 165 170 175

Val Tyr Lys Val Thr Pro Val Met Asn Thr His Pro Ser Gln Ser Glu
 180 185 190

Ala Val Ser Asp Val Trp Ser Leu Ser Lys Thr Ser Met Thr Phe Gln
 195 200 205

Pro Lys Lys Ala Ser Leu Gln Pro Leu Thr Ile Ser Leu Asp Glu Leu
 210 215 220

Phe Ser Ser Arg Gly Glu Phe Ile Ser Val Gly Gly Asn Gly Arg Met
 225 230 235 240

Ser His Lys Glu Ala Ile Leu Leu Gly Leu Arg Tyr Lys Lys Leu Tyr
 245 250 255

Asn Gln Ala Arg Val Lys Tyr Ser Leu
 260 265

<210> 28

<211> 690

<212> DNA

<213> Vesicular stomatitis virus

<400> 28

atgagttcct taaagaagat tctcggtctg aaggggaaaag gtaagaaaatc taagaaaatta 60
 gggatcgac cacccctta tgaagaggac actagcatgg agtatgcctc gagcgctcca 120
 attgacaaat cctattttgg agttgacgag atggacacct atgatccgaa tcaatataaga 180
 tatgagaaat tcttctttac agtgaaaatg acggtagat ctaatcgccc gttcagaaca 240
 tactcagatg tggcagccgc tgtatccat tggatcaca tgtacatcgg aatggcaggg 300
 aaacgtccct tctacaaaat cttggcttt ttgggttctt ctaatctaaa ggccactcca 360

gcggatttgg cagatcaagg tcaaccagag tatcacactc actgcgaagg cagggcttat 420
ttgccacata ggatgggaa gaccctccc atgctcaatg taccagagca cttcagaaga 480
ccattcaata taggtctta caagggAACG attgagctca caatgaccat ctacgatgat 540
gagtcactgg aagcagctcc tatgatctgg gatcattca attcttccaa atttctgat 600
ttcagagaga aggcctaatt gttggcctg attgtcgaga aaaaggcatc tggagcgtgg 660
gtcctggatt ctatcagcca cttcaaatga 690

<210> 29
<211> 690
<212> DNA
<213> Vesicular stomatitis virus

<400> 29
atgagttcct taaagaagat tctcggtctg aaggggaaag gtaagaaatc taagaaatta 60
gggatcgac cacccctta tgaagaggac actaacatgg agtatgctcc gagcgctcca 120
attgacaaat cctattttgg agttgacgag atggacactc atgatccgca tcaattaaga 180
tatgagaaat tcttcttac agtggaaaatg acggtagat ctaatcgcc gttcagaaca 240
tactcagatg tggcagccgc tggatccat tggatcaca tggatcgaa aatggcaggg 300
aaacgtccct tctacaagat ctggctttt ttggwtctt ctaatctaaa ggccactcca 360
gcggatttgg cagatcaagg tcaaccagag tatcacgctc actgtgaagg cagggcttat 420
ttgccacaca gaatgggaa gaccctccc atgctcaatg taccagagca cttcagaaga 480
ccattcaata taggtctta caagggAACG gttgagctca caatgaccat ctacgatgat 540
gagtcactgg aagcagctcc tatgatctgg gatcattca attcttccaa atttctgat 600
ttcagagaga aggcctaatt gttggcctg attgtcgaga aaaaggcatc tggagcgtgg 660
gtcctggatt ctgtcagcca cttcaaatga 690

<210> 30
<211> 690
<212> DNA
<213> Vesicular stomatitis virus

<400> 30
atgagttcct taaagaagat tctcggtctg aaggggaaag gtaagaaatc taagaaatta 60
gggatcgac cacccctta tgaagaggac actaacatgg agtatgctcc gagcgctcca 120
attgacaaat cctattttgg agttgacgag agggacactc atgatccgca tcaattaaga 180
tatgagaaat tcttcttac agtggaaaatg acggtagat ctaatcgcc gttcagaaca 240
tactcagatg tggcagccgc tggatccat tggatcaca tggatcgaa aatggcaggg 300
aaacgtccct tctacaagat ctggctttt ttggwtctt ctaatctaaa ggccactcca 360
gcggatttgg cagatcaagg tcaaccagag tatcacgctc actgtgaagg cagggcttat 420
ttgccacaca gaatgggaa gaccctccc atgctcaatg taccagagca cttcagaaga 480
ccattcaata taggtctta caagggAACG gttgagctca caatgaccat ctacgatgat 540
gagtcactgg aagcagctcc tatgatctgg gatcattca attcttccaa atttctgat 600
ttcagagaga aggcctaatt gttggcctg attgtcgaga aaaaggcatc tggagcgtgg 660
gtcctggatt ctgtcagcca cttcaaatga 690

<210> 31
<211> 690
<212> DNA
<213> Vesicular stomatitis virus

<400> 31
atgagttcct taaagaagat tctcggtctg aaggggaaag gtaagaaatc taagaaatta 60
gggatcgac cacccctta tgaagaggac actaacatgg agtatgctcc gagcgctcca 120
attgacaaat cctattttgg agttgacgag atggacactc atgatccgca tcaattaaga 180

tatgagaaaat tcttctttac agtggaaatg acggtagat ctaatcgcc gttcagaaca 240
tactcagatg tggcagccgc tgtatcccat tggatcaca tgtacatcg aatggcagg 300
aaacgtccct tctacaagat ctggcttt ttgggttctt ctaatctaaa ggccactcca 360
gcggtattgg cagatcaagg tcaaccagag ttcacgctc actgtgaagg cagggcttat 420
ttgccacaca gaatgggaa gaccctccc atgctcaatg taccagagca cttcagaaga 480
ccattcaata taggtctta caagggAACG gttgagctca caatgaccat ctacgatgat 540
gagtcactgg aagcagctcc tatgatctgg gtcattca attcttccaa attttctgat 600
ttcagagaga aggccctaat gttggcctg attgtcgaga aaaaggcatc tggagcttgg 660
gtcctggatt ctgtcagcca cttcaaata 690

<210> 32
<211> 229
<212> PRT
<213> Vesicular stomatitis virus

<400> 32
Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys
1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Ser
20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val
35 40 45

Asp Glu Met Asp Thr Tyr Asp Pro Asn Gln Leu Arg Tyr Glu Lys Phe
50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr
65 70 75 80

Tyr Ser Asp Val Ala Ala Ala Val Ser His Trp Asp His Met Tyr Ile
85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly
100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln
115 120 125

Pro Glu Tyr His Thr His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg
130 135 140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg
145 150 155 160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Ile Glu Leu Thr Met Thr
165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His
180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe
195 200 205

Gly Leu Ile Val Glu Lys Ala Ser Gly Ala Trp Val Leu Asp Ser

210

215

220

Ile Ser His Phe Lys
225

<210> 33
<211> 229
<212> PRT
<213> Vesicular stomatitis virus

<400> 33
Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys
1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn
20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val
35 40 45

Asp Glu Met Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe
50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr
65 70 75 80

Tyr Ser Asp Val Ala Ala Ala Val Ser His Trp Asp His Met Tyr Ile
85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly
100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln
115 120 125

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg
130 135 140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg
145 150 155 160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr
165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His
180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe
195 200 205

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser
210 215 220

Val Ser His Phe Lys
225

<210> 34
<211> 229
<212> PRT
<213> Vesicular stomatitis virus

<400> 34

Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys
1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn
20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val
35 40 45

Asp Glu Met Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe
50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr
65 70 75 80

Tyr Ser Asp Val Ala Ala Val Ser His Trp Asp His Met Tyr Ile
85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly
100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln
115 120 125

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg
130 135 140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg
145 150 155 160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr
165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His
180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe
195 200 205

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser
210 215 220

Val Ser His Phe Lys
225

<210> 35
<211> 229
<212> PRT
<213> Vesicular stomatitis virus

<400> 35
Met Ser Ser Leu Lys Lys Ile Leu Gly Leu Lys Gly Lys Gly Lys Lys
1 5 10 15

Ser Lys Lys Leu Gly Ile Ala Pro Pro Pro Tyr Glu Glu Asp Thr Asn
20 25 30

Met Glu Tyr Ala Pro Ser Ala Pro Ile Asp Lys Ser Tyr Phe Gly Val
35 40 45

Asp Glu Arg Asp Thr His Asp Pro His Gln Leu Arg Tyr Glu Lys Phe
50 55 60

Phe Phe Thr Val Lys Met Thr Val Arg Ser Asn Arg Pro Phe Arg Thr
65 70 75 80

Tyr Ser Asp Val Ala Ala Ala Val Ser His Trp Asp His Met Tyr Ile
85 90 95

Gly Met Ala Gly Lys Arg Pro Phe Tyr Lys Ile Leu Ala Phe Leu Gly
100 105 110

Ser Ser Asn Leu Lys Ala Thr Pro Ala Val Leu Ala Asp Gln Gly Gln
115 120 125

Pro Glu Tyr His Ala His Cys Glu Gly Arg Ala Tyr Leu Pro His Arg
130 135 140

Met Gly Lys Thr Pro Pro Met Leu Asn Val Pro Glu His Phe Arg Arg
145 150 155 160

Pro Phe Asn Ile Gly Leu Tyr Lys Gly Thr Val Glu Leu Thr Met Thr
165 170 175

Ile Tyr Asp Asp Glu Ser Leu Glu Ala Ala Pro Met Ile Trp Asp His
180 185 190

Phe Asn Ser Ser Lys Phe Ser Asp Phe Arg Glu Lys Ala Leu Met Phe
195 200 205

Gly Leu Ile Val Glu Lys Lys Ala Ser Gly Ala Trp Val Leu Asp Ser
210 215 220

Val Ser His Phe Lys
225

<210> 36
<211> 1536
<212> DNA
<213> Vesicular stomatitis virus

<400> 36
atgaagtgcc ttttgtactt agcctttta ttcattgggg tgaattgcaa gttcaccata 60
gttttccac acaaccaaaa aggaaactgg aaaaatgttc cttctaatta ccattattgc 120
ccgtcaagct cagattaaa ttggcataat gacttaatag gcacagccat acaagtcaaa 180

atgcccaga gtcacaaggc tattcaagca gacggttgg a t g t c a t g c t t c c a a t g g 240
gtcactactt gtgatttccg ctggtatggc ccgaagtata taacacagtc catccgatcc 300
ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360
ctgaatccag gcttcctcc tcaaagtgt ggatatgca ctgtgacgga tgccgaagca 420
gtgattgtcc aggtgactcc tcaccatgtg ctgggtatg aatacacagg agaatgggtt 480
gattcacagt tcatcaacgg aaaatgcagc aattacatat gccccactgt ccataactct 540
acaacctggc attctgacta taaggtcaaa gggctatgtg attctaacct catttccatg 600
gacatcacct tcttcctcaga ggacggagag ctatcatccc tgggaaagga gggcacaggg 660
ttcagaagta actacttgc ttatgaaact ggaggcaagg cctgcaaaaat gcaataactgc 720
aagcattggg gagtcagact cccatcaggt gtctggttcg agatggctga taaggatctc 780
tttgctgcag ccagattccc tgaatgccca gaagggtcaa gtatctctgc tccatctcag 840
acctcagtgg atgtaagtct aattcaggac gttgagagga tttggatta ttccctctgc 900
caagaaacct ggagcaaaaat cagagcgggt cttccaatct cttcagtgga tctcagctat 960
cttgctccataaaaaccagg aaccggctct gctttcacca taatcaatgg taccctaaaa 1020
tactttgaga ccagatacat cagagtcgtt attgctgctc caatcctctc aagaatggtc 1080
ggaatgatca gtggaactac cacagaaagg gaactgtggg atgactgggc accatatgaa 1140
gacgtggaaa ttggacccaa tggagttctg aggaccagtt caggatataa gtttccttta 1200
tacatgattt gacatggat gttggactcc gatcttcattt ttagctcaaa ggctcaggtg 1260
ttcgaacatc ctcacattca agacgctgct tcgcaacttc ctgatgatgaa gagtttattt 1320
tttgggtgata ctgggctatc caaaaatcca atcgagctt tagaagggtt gttcagtagt 1380
tggaaaagct ctattgcctc tttttctt atcataggta taatcattgg actattctt 1440
gttctccgag ttggtatcca tctttgcatt aaattaaagc acaccaagaa aagacagatt 1500
tatacagaca tagagatgaa ccgacttgaa aagtaa 1536

<210> 37
<211> 885
<212> DNA
<213> Vesicular stomatitis virus

<220>
<221> modified_base
<222> (1)..(885)
<223> "n" represents a, t, c, g, other or unknown

<400> 37
atgaagtgcc ttttgkactt agcttttta ttcatcgaaa tgaattgca gttcaccata 60
gtttttccat acaaccaaaa aggaaactgg aaaaatgttc cttccaatta ccattattgc 120
ccgtcaagct cagatttaaa ttgnataat gacttaataag gcacagcctt acaagtcaaa 180
atgcccaga gtcacaaggc tattcaagca gacggttgg a t g t c a t g c t t c c a a t g g 240
gtcactactt gtgatttccg ctggtacggc ccgaagtata taacacattt catccgatcc 300
ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360
ctgaatccag gcttcctcc tcaaagtgt ggatatgca ctgtgacgga tgctgaagca 420
gctgattgtcc aggtgactcc tcaccatgtg ctgggtatg aatacacagg agaatgggtt 480
gattcacagt tcatcaacgg aaaatgcagc aatgacatata gccccactgt ccataactcc 540
acaacctggc attccgacta taaggtcaaa gggctatgtg attctaacct catttccatg 600
gacatcacct tcttcctcaga ggacggagag ctatcatccc taggaaagga gggcacaggg 660
ttcagaagta actacttgc ttatgaaact ggagacaagg cctgcaaaaat gcaataactgc 720
aagcgttggg gagtcagact cccatcaggt gtctggttcg agatggctga taaggatctc 780
tttgctgcag ccagattccc tgaatgccca gaagggtcaa gtatctctgc tccatctcag 840
acctcagtgg atgtaagtct cattcaggac gttgagagga tcttg 885

<210> 38
<211> 705
<212> DNA
<213> Vesicular stomatitis virus

<400> 38
ccatctcaga cctcagtgg a tgtaagtctc attcaggacg ttgagaggat cttggattat 60
tccctctgcc aagaaacctg gagcaaaaatc agagcgggtc ttcccatttc tccagtggat 120
ctcagctatc ttgctcctaa aaaccaggaa accggtcctg tcttaccat aatcaatgg 180
accctaaaaat actttgagac cagatacatc agagtcgata ttgctgctcc aatcctctca 240
agaatggtcg gaatgatcag tggacttacc acagaaaggg aactgtggga tgactggct 300
ccatatgaag acgtggaaat tggacccaat ggagttctga ggaccagttc aggatataag 360
tttcctttat atatgattgg acatggatg ttggactccg atcttcattt tagctcaaag 420
gctcagggtgt ttgaacatcc tcacattcaa gacgctgctt cgccagttcc tgatgtatgg 480
actttatccc ttggtgatcc tgggctatcc aaaaatccaa tcgagtttgt agaagggttgg 540
ttcagtagtt ggaagagctc tattgcctct ttttcttta tcataagggtt aatcatttgg 600
ctattcttgg ttctccgagt tggtatttat ctggcattt aattaaagca caccaagaaa 660
agacagattt atacagacat agagatgaac cgacttggga agtaa 705

<210> 39
<211> 1536
<212> DNA
<213> Vesicular stomatitis virus

<400> 39
atgaagtgcc tttgtactt agcttttta ttcatcgaaaa tgaattgcaa gttcaccata 60
gttttccat acaaccgaaa aggaaactgg aaaaatgttc cttccaatta ccattattgc 120
ccgtcaagct cagattaaa ttggcataat gacttaatag gcacagcctt acaagtcaaa 180
atgcccaaga gtcacaaggc tattcaagca gacgggttggc tttgtcatgc ttccaaatgg 240
gtcactactt gtgatttccg ctggtagcggc cccaaatgtata taacacattc catccgatcc 300
ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360
ctgaatccag gctccctcc tcaaagggtt ggtatatgca ctgtgacggc tgctgaagca 420
gcgattgtcc aggtgactcc tcaccatgtg cttgttgc aatacacagg agaatgggtt 480
gattcacagt tcatacggc aaaatgcgc aatgacatata gccccactgt ccataactcc 540
acaacctggc attccgacta taaggtcaaa ggctatgtt attctaacctt catttccatg 600
gacatcacct tcttcctcaga ggacggagag ctatcatccc taggaaagga gggcacagg 660
ttcagaagta actactttgc ttatgaaact ggagacaagg cctgcaaaat gcagtactgc 720
aagcattggg gagtcagact cccatcagggt gtctgggttcg agatggctga taaggatctc 780
tttgctgcag ccagattccc tgaatgccc gaagggtcaa gtatctctgc tccatctcag 840
acctcagtgg atgtaagtct cattcaggac gttgagagga tcttgattt ttccctctgc 900
caagaaacct ggagcaaaat cagagcgggt ctcccattct ctccagtggc tctcagctat 960
cttgctccta aaaacccagg aaccggctt gcttcacca taatcaatgg taccctaaaa 1020
tactttgaga ccagatacat cagagtgcgtt attgctgc tcaatcctctc aagaatggc 1080
ggaatgatca gtgaaactac cacagaaagg gaactgtggg atgactgggc tccatatgaa 1140
gacgtggaaa ttggacccaa tggagttctg aggaccagtt caggatataa gtttccttta 1200
tatatgattt gacatggat tttggactcc gatcttcattt ttagctcaaa ggctcagggt 1260
tttgaacatc ctcacattca agacgcgtt ggcgcagcttc ctgtatgtt gactttattt 1320
tttgggtata ctgggctatc caaaaatcca atcgagttt tagaaggtt gttcagtagt 1380
tggaaagatctt ctattgcctc tttttctttt atcatagggt taatcattgg actattctg 1440
gttctcccgag ttggatattt tctttgcatt aaattaaagc acaccaagaa aagacagatt 1500
tatacagaca tagagatgaa ccgacttggg aagttaa 1536

<210> 40
<211> 1399
<212> DNA
<213> Vesicular stomatitis virus

<400> 40
atgaagtgc ttttgtactt agcttttta ttcatcgaaa tgaattgcaa gttcaccata 60

gttttccat acaaccaaaa aggaaactgg aaaaatgtc cttccaatta ccattattgc 120
 ccgtcaagct cagatttaaa ttggcataat gacttaatag gcacagcctt acaggtcaaa 180
 atgcccaga gtcacaaggc tattcaagca gacggttgg a t g t g t c a t g c t t c c a a t g g 240
 gtcactactt gtgatttccg ctggtagcga ccgaagtata taacacattc catccgatcc 300
 ttcactccat ctgtagaaca atgcaaggaa agcattgaac aaacgaaaca aggaacttgg 360
 ctgaatccag gcttccctcc tcaaagtgtt ggatatgca ctgtgacgga tgctgaagca 420
 gcgattgtcc aggtgactcc tcaccatgtg cttgttgatg aatacacagg agaatgggtt 480
 gattcacagt tcatcaacgg aaaatgcagc aatgacatat gccccactgt ccataactcc 540
 acaacctggc attccgacta taaggtcaaa gggctatgtt attctaaccct catttccatg 600
 gacatcacct tcttctcaga ggacggagag ctatcatccc taggaaagg gggcacaggg 660
 ttcagaagta actactttgc ttatgaaact ggagacaagg cctgcaaaat gcagtactgc 720
 aagcggtggg gagtcagact cccatcaggt gtctggttcg ggatggctga taaggatctc 780
 tttgctgcag ccagattccc tgaatgccc gaagggtcaa gatatctgc tccatctcag 840
 acctcagtgg atgtaagtct cattcaggac gttgagagga tcttactttt agaccagata 900
 catcagagtc gatattgctg ctccaatcct ctcaagaatg gtcggaatga tcagtgaaac 960
 taccacagaa agggactgt gggatgactg ggctccatata gaagacgtgg aaattggacc 1020
 caatggagtt ctgaggacca gttcaggata taagttccct ttatatatga ttggacatgg 1080
 tatgttggac tccgatctc atcttagctc aaaggctcg gtgttgaac atcctcacat 1140
 tcaagacgct gcttcgcagc ttccgtatga tgagacttta tttttgggt atactggct 1200
 atccaaaaat ccaatcgagt ttgtagaagg ttggttcagt agttggaaaga gctctattgc 1260
 ctcttttc ttatcatag ggttaatcat tggactattc ttggttctcc gagttggtat 1320
 ttatcttgc attaaattaa agcacaccaa gaaaagacag atttatacag acatagagat 1380
 gaaccgactt ggaaagtaa 1399

<210> 41
 <211> 511
 <212> PRT
 <213> Vesicular stomatitis virus

<400> 41
 Met Lys Cys Leu Leu Tyr Leu Ala Phe Leu Phe Ile Gly Val Asn Cys
 1 5 10 15

Lys Phe Thr Ile Val Phe Pro His Asn Gln Lys Gly Asn Trp Lys Asn
 20 25 30

Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Trp
 35 40 45

His Asn Asp Leu Ile Gly Thr Ala Ile Gln Val Lys Met Pro Lys Ser
 50 55 60

His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp
 65 70 75 80

Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr Gln
 85 90 95

Ser Ile Arg Ser Phe Thr Pro Ser Val Glu Gln Cys Lys Glu Ser Ile
 100 105 110

Glu Gln Thr Lys Gln Gly Thr Trp Leu Asn Pro Gly Phe Pro Pro Gln
 115 120 125

Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Val Ile Val Gln
 130 135 140

Val Thr Pro His His Val Leu Val Asp Glu Tyr Thr Gly Glu Trp Val
145 150 155 160

Asp Ser Gln Phe Ile Asn Gly Lys Cys Ser Asn Tyr Ile Cys Pro Thr
165 170 175

Val His Asn Ser Thr Thr Trp His Ser Asp Tyr Lys Val Lys Gly Leu
180 185 190

Cys Asp Ser Asn Leu Ile Ser Met Asp Ile Thr Phe Phe Ser Glu Asp
195 200 205

Gly Glu Leu Ser Ser Leu Gly Lys Glu Gly Thr Gly Phe Arg Ser Asn
210 215 220

Tyr Phe Ala Tyr Glu Thr Gly Gly Lys Ala Cys Lys Met Gln Tyr Cys
225 230 235 240

Lys His Trp Gly Val Arg Leu Pro Ser Gly Val Trp Phe Glu Met Ala
245 250 255

Asp Lys Asp Leu Phe Ala Ala Ala Arg Phe Pro Glu Cys Pro Glu Gly
260 265 270

Ser Ser Ile Ser Ala Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile
275 280 285

Gln Asp Val Glu Arg Ile Leu Asp Tyr Ser Leu Cys Gln Glu Thr Trp
290 295 300

Ser Lys Ile Arg Ala Gly Leu Pro Ile Ser Pro Val Asp Leu Ser Tyr
305 310 315 320

Leu Ala Pro Lys Asn Pro Gly Thr Gly Pro Ala Phe Thr Ile Ile Asn
325 330 335

Gly Thr Leu Lys Tyr Phe Glu Thr Arg Tyr Ile Arg Val Asp Ile Ala
340 345 350

Ala Pro Ile Leu Ser Arg Met Val Gly Met Ile Ser Gly Thr Thr Thr
355 360 365

Glu Arg Glu Leu Trp Asp Asp Trp Ala Pro Tyr Glu Asp Val Glu Ile
370 375 380

Gly Pro Asn Gly Val Leu Arg Thr Ser Ser Gly Tyr Lys Phe Pro Leu
385 390 395 400

Tyr Met Ile Gly His Gly Met Leu Asp Ser Asp Leu His Leu Ser Ser
405 410 415

Lys Ala Gln Val Phe Glu His Pro His Ile Gln Asp Ala Ala Ser Gln
420 425 430

Leu Pro Asp Asp Glu Ser Leu Phe Phe Gly Asp Thr Gly Leu Ser Lys
435 440 445

Asn Pro Ile Glu Leu Val Glu Gly Trp Phe Ser Ser Trp Lys Ser Ser
450 455 460

Ile Ala Ser Phe Phe Ile Ile Gly Leu Ile Ile Gly Leu Phe Leu
465 470 475 480

Val Leu Arg Val Gly Ile His Leu Cys Ile Lys Leu Lys His Thr Lys
485 490 495

Lys Arg Gln Ile Tyr Thr Asp Ile Glu Met Asn Arg Leu Gly Lys
500 505 510

<210> 42
<211> 295
<212> PRT
<213> Vesicular stomatitis virus

<220>
<221> MOD_RES
<222> (1)..(295)
<223> "Xaa" represents any, other or unknown amino acid

<400> 42
Met Lys Cys Leu Leu Xaa Leu Ala Phe Leu Phe Ile Gly Val Asn Cys
1 5 10 15

Lys Phe Thr Ile Val Phe Pro Tyr Asn Gln Lys Gly Asn Trp Lys Asn
20 25 30

Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Xaa
35 40 45

His Asn Asp Leu Ile Gly Thr Ala Leu Gln Val Lys Met Pro Lys Ser
50 55 60

His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp
65 70 75 80

Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr His
85 90 95

Ser Ile Arg Ser Phe Thr Pro Ser Val Glu Gln Cys Lys Glu Ser Ile
100 105 110

Glu Gln Thr Lys Gln Gly Thr Trp Leu Asn Pro Gly Phe Pro Pro Gln
115 120 125

Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Ala Ile Val Gln
130 135 140

Val Thr Pro His His Val Leu Val Asp Glu Tyr Thr Gly Glu Trp Val
145 150 155 160

Asp Ser Gln Phe Ile Asn Gly Lys Cys Ser Asn Asp Ile Cys Pro Thr
165 170 175

Val His Asn Ser Thr Thr Trp His Ser Asp Tyr Lys Val Lys Gly Leu
180 185 190

Cys Asp Ser Asn Leu Ile Ser Met Asp Ile Thr Phe Phe Ser Glu Asp
195 200 205

Gly Glu Leu Ser Ser Leu Gly Lys Glu Gly Thr Gly Phe Arg Ser Asn
210 215 220

Tyr Phe Ala Tyr Glu Thr Gly Asp Lys Ala Cys Lys Met Gln Tyr Cys
225 230 235 240

Lys Arg Trp Gly Val Arg Leu Pro Ser Gly Val Trp Phe Glu Met Ala
245 250 255

Asp Lys Asp Leu Phe Ala Ala Ala Arg Phe Pro Glu Cys Pro Glu Gly
260 265 270

Ser Ser Ile Ser Ala Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile
275 280 285

Gln Asp Val Glu Arg Ile Leu
290 295

<210> 43
<211> 234
<212> PRT
<213> Vesicular stomatitis virus

<400> 43

Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile Gln Asp Val Glu Arg
1 5 10 15

Ile Leu Asp Tyr Ser Leu Cys Gln Glu Thr Trp Ser Lys Ile Arg Ala
20 25 30

Gly Leu Pro Ile Ser Pro Val Asp Leu Ser Tyr Leu Ala Pro Lys Asn
35 40 45

Pro Gly Thr Gly Pro Val Phe Thr Ile Ile Asn Gly Thr Leu Lys Tyr
50 55 60

Phe Glu Thr Arg Tyr Ile Arg Val Asp Ile Ala Ala Pro Ile Leu Ser
65 70 75 80

Arg Met Val Gly Met Ile Ser Gly Thr Thr Glu Arg Glu Leu Trp
85 90 95

Asp Asp Trp Ala Pro Tyr Glu Asp Val Glu Ile Gly Pro Asn Gly Val
100 105 110

Leu Arg Thr Ser Ser Gly Tyr Lys Phe Pro Leu Tyr Met Ile Gly His
115 120 125

Gly Met Leu Asp Ser Asp Leu His Leu Ser Ser Lys Ala Gln Val Phe

130 135 140
Glu His Pro His Ile Gln Asp Ala Ala Ser Gln Leu Pro Asp Asp Glu
145 150 155 160

Thr Leu Phe Phe Gly Asp Thr Gly Leu Ser Lys Asn Pro Ile Glu Phe
165 170 175

Val Glu Gly Trp Phe Ser Ser Trp Lys Ser Ser Ile Ala Ser Phe Phe
180 185 190

Phe Ile Ile Gly Leu Ile Ile Gly Leu Phe Leu Val Leu Arg Val Gly
195 200 205

Ile Tyr Leu Cys Ile Lys Leu Lys His Thr Lys Lys Arg Gln Ile Tyr
210 215 220

Thr Asp Ile Glu Met Asn Arg Leu Gly Lys
225 230

<210> 44
<211> 511
<212> PRT
<213> Vesicular stomatitis virus

<220>
<221> MOD_RES
<222> (1)..(511)
<223> "Xaa" represents any, other or unknown amino acid

<400> 44
Met Lys Cys Leu Leu Tyr Leu Ala Phe Leu Phe Ile Gly Val Asn Cys
1 5 10 15

Lys Phe Thr Ile Val Phe Pro Tyr Asn Arg Lys Gly Asn Trp Lys Asn
20 25 30

Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Trp
35 40 45

His Asn Asp Leu Ile Gly Thr Ala Leu Gln Val Lys Met Pro Lys Ser
50 55 60

His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp
65 70 75 80

Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr His
85 90 95

Ser Ile Arg Ser Phe Thr Pro Ser Val Glu Gln Cys Lys Glu Ser Ile
100 105 110

Glu Gln Thr Lys Gln Gly Thr Trp Leu Asn Pro Gly Phe Pro Pro Gln
115 120 125

Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Ala Ile Val Gln

130 135 140
Val Thr Pro His His Val Leu Val Asp Glu Tyr Thr Gly Glu Trp Val
145 150 155 160
Asp Ser Gln Phe Ile Asn Gly Lys Cys Ser Asn Asp Ile Cys Pro Thr
165 170 175
Val His Asn Ser Thr Thr Trp His Ser Asp Tyr Lys Val Lys Gly Leu
180 185 190
Cys Asp Ser Asn Leu Ile Ser Met Asp Ile Thr Phe Phe Ser Glu Asp
195 200 205
Gly Glu Leu Ser Ser Leu Gly Lys Glu Gly Thr Gly Phe Arg Ser Asn
210 215 220
Tyr Phe Ala Tyr Glu Thr Gly Asp Lys Ala Cys Lys Met Gln Tyr Cys
225 230 235 240
Lys His Trp Gly Val Arg Leu Pro Ser Gly Val Trp Phe Glu Met Ala
245 250 255
Asp Lys Asp Leu Phe Ala Ala Ala Arg Phe Pro Glu Cys Pro Glu Gly
260 265 270
Ser Ser Ile Ser Ala Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile
275 280 285
Gln Asp Val Glu Arg Ile Leu Asp Tyr Ser Leu Cys Gln Glu Thr Trp
290 295 300
Ser Lys Ile Arg Ala Gly Leu Pro Ile Ser Pro Val Asp Leu Ser Tyr
305 310 315 320
Leu Ala Pro Lys Asn Pro Gly Thr Gly Pro Ala Phe Thr Ile Ile Asn
325 330 335
Gly Thr Leu Lys Tyr Phe Glu Thr Arg Tyr Ile Arg Val Asp Ile Ala
340 345 350
Ala Pro Ile Leu Ser Arg Met Val Gly Met Ile Ser Gly Thr Thr Thr
355 360 365
Glu Arg Glu Leu Trp Asp Asp Trp Ala Pro Tyr Glu Asp Val Glu Ile
370 375 380
Gly Pro Asn Gly Val Leu Arg Thr Ser Ser Gly Tyr Lys Phe Pro Leu
385 390 395 400
Tyr Met Ile Gly His Gly Met Leu Asp Ser Asp Leu His Leu Ser Ser
405 410 415
Lys Ala Gln Val Phe Glu His Pro His Ile Gln Asp Ala Xaa Ala Gln
420 425 430
Leu Pro Asp Asp Glu Thr Leu Phe Phe Gly Asp Thr Gly Leu Ser Lys

435

440

445

Asn Pro Ile Glu Phe Val Glu Gly Trp Phe Ser Ser Trp Lys Ser Ser
450 455 460

Ile Ala Ser Phe Phe Ile Ile Gly Leu Ile Ile Gly Leu Phe Leu
465 470 475 480

Val Leu Arg Val Gly Ile Tyr Leu Cys Ile Lys Leu Lys His Thr Lys
485 490 495

Lys Arg Gln Ile Tyr Thr Asp Ile Glu Met Asn Arg Leu Gly Lys
500 505 510

<210> 45
<211> 465
<212> PRT
<213> Vesicular stomatitis virus

<400> 45
Met Lys Cys Leu Leu Tyr Leu Ala Phe Leu Phe Ile Gly Val Asn Cys
1 5 10 15

Lys Phe Thr Ile Val Phe Pro Tyr Asn Gln Lys Gly Asn Trp Lys Asn
20 25 30

Val Pro Ser Asn Tyr His Tyr Cys Pro Ser Ser Ser Asp Leu Asn Trp
35 40 45

His Asn Asp Leu Ile Gly Thr Ala Leu Gln Val Lys Met Pro Lys Ser
50 55 60

His Lys Ala Ile Gln Ala Asp Gly Trp Met Cys His Ala Ser Lys Trp
65 70 75 80

Val Thr Thr Cys Asp Phe Arg Trp Tyr Gly Pro Lys Tyr Ile Thr His
85 90 95

Ser Ile Arg Ser Phe Thr Pro Ser Val Glu Gln Cys Lys Glu Ser Ile
100 105 110

Glu Gln Thr Lys Gln Gly Thr Trp Leu Asn Pro Gly Phe Pro Pro Gln
115 120 125

Ser Cys Gly Tyr Ala Thr Val Thr Asp Ala Glu Ala Ala Ile Val Gln
130 135 140

Val Thr Pro His His Val Leu Val Asp Glu Tyr Thr Gly Glu Trp Val
145 150 155 160

Asp Ser Gln Phe Ile Asn Gly Lys Cys Ser Asn Asp Ile Cys Pro Thr
165 170 175

Val His Asn Ser Thr Thr Trp His Ser Asp Tyr Lys Val Lys Gly Leu
180 185 190

Cys Asp Ser Asn Leu Ile Ser Met Asp Ile Thr Phe Phe Ser Glu Asp
195 200 205

Gly Glu Leu Ser Ser Leu Gly Lys Glu Gly Thr Gly Phe Arg Ser Asn
210 215 220

Tyr Phe Ala Tyr Glu Thr Gly Asp Lys Ala Cys Lys Met Gln Tyr Cys
225 230 235 240

Lys Arg Trp Gly Val Arg Leu Pro Ser Gly Val Trp Phe Gly Met Ala
245 250 255

Asp Lys Asp Leu Phe Ala Ala Ala Arg Phe Pro Glu Cys Pro Glu Gly
260 265 270

Ser Ser Ile Ser Ala Pro Ser Gln Thr Ser Val Asp Val Ser Leu Ile
275 280 285

Gln Asp Val Glu Arg Ile Tyr Phe Glu Thr Arg Tyr Ile Arg Val Asp
290 295 300

Ile Ala Ala Pro Ile Leu Ser Arg Met Val Gly Met Ile Ser Gly Thr
305 310 315 320

Thr Thr Glu Arg Glu Leu Trp Asp Asp Trp Ala Pro Tyr Glu Asp Val
325 330 335

Glu Ile Gly Pro Asn Gly Val Leu Arg Thr Ser Ser Gly Tyr Lys Phe
340 345 350

Pro Leu Tyr Met Ile Gly His Gly Met Leu Asp Ser Asp Leu His Leu
355 360 365

Ser Ser Lys Ala Gln Val Phe Glu His Pro His Ile Gln Asp Ala Ala
370 375 380

Ser Gln Leu Pro Asp Asp Glu Thr Leu Phe Phe Gly Asp Thr Gly Leu
385 390 395 400

Ser Lys Asn Pro Ile Glu Phe Val Glu Gly Trp Phe Ser Ser Trp Lys
405 410 415

Ser Ser Ile Ala Ser Phe Phe Ile Ile Gly Leu Ile Ile Gly Leu
420 425 430

Phe Leu Val Leu Arg Val Gly Ile Tyr Leu Cys Ile Lys Leu Lys His
435 440 445

Thr Lys Lys Arg Gln Ile Tyr Thr Asp Ile Glu Met Asn Arg Leu Gly
450 455 460

Lys
465

<210> 46
<211> 6330

<212> DNA

<213> Vesicular stomatitis virus

<400> 46

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 tgttcagcta ctcatgtga cacattaaga tacaatcct ggggccgtac agttattggg 3300
 acaactgtac cccatccatt agaaaatgtt ggtccacaac atcgaaaaga gactccttgt 3360
 gcaccatgtac acacatcagg gttcaattat gttctgtgc attgtccaga cggatccat 3420
 gacgtctta gttcacgggg accattgcct gcttatctag ggtctaaaac atctgaatct 3480
 acatcttatt tgcagccttgg gaaaaggaa agcaaagtcc cactgattaa aagagctaca 3540
 cgcttagag atgctatctc ttggttgtt gaacccgact ctaaaactagc aatgactata 3600
 cttaaca tccactctt aacaggcgaa gaatggacca aaaggcgcga tgggtcaaaa 3660
 agaacagggt ctgccttca taggtttcg acatctcgga tgagccatgg tgggttcgca 3720
 ttcagagca ctgcagcatt gaccaggtt atggcaacta cagacaccat gagggatctg 3780
 ggagatcaga atttcgactt tttattccaa gcaacgttgc tctatgtcga aattaccacc 3840
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 tcctgtttga gaccataga agagatcacc ctggactcaa gtatggacta cacgcxxxx 3960
 gatgtatccc atgtgctgaa gacatggagg aatggggaa gttcgtgggg acaagagata 4020
 aaacagatct atccctttaga aggaaattgg aagaatttag cacctgctga gcaatcctat 4080
 caagtccgca gatgtatagg ttttctatat ggagacttgg cgtatagaaa atctactcat 4140
 gcccaggaca gttctctatt tcctctatct atacaaggcgtt gtattagagg tcgaggtttc 4200
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 gataaattga gtgtatcacc tccattcctt tctcttacta gatcaggacc tattagagac 4380
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 tgggaagaca tacatgtgaa atttttccacc aaggacatata tattgtgtcc agagggaaatc 4740
 agacatgctt gcaagttcggtt gattgctaaat gataataata aagacatgag ctatccccct 4800
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<211> 5327

<212> DNA

<213> Vesicular stomatitis virus

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<212> DNA  
<213> Vesicular stomatitis virus
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<213> Vesicular stomatitis virus

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tgctgtacag tggataatca ttgaaatgg tcaaatttgc gaaaaaacac aggaatgtac 6240
gaatggatca atagacgaat ttcaaaaagaa gaccggctca tactgtatgtt gaagagtgac 6300
ctacatgagg aaaactctt gagagattaa 6330

<210> 50
<211> 2109
<212> PRT
<213> Vesicular stomatitis virus

<400> 50
Met Glu Val His Asp Phe Glu Thr Asp Glu Phe Asn Asp Phe Asn Glu
1 5 10 15

Asp Asp Tyr Ala Thr Arg Glu Phe Leu Asn Pro Asp Glu Arg Met Thr
20 25 30

Tyr Leu Asn His Ala Asp Tyr Asn Leu Asn Ser Pro Leu Ile Ser Asp
35 40 45

Asp Ile Asp Asn Leu Ile Arg Lys Phe Asn Ser Leu Pro Ile Pro Ser
50 55 60

Met Trp Asp Ser Lys Asn Trp Asp Gly Val Leu Glu Met Leu Thr Ser
65 70 75 80

Cys Gln Ala Asn Pro Ile Ser Thr Ser Gln Met His Lys Trp Met Gly
85 90 95

Ser Trp Leu Met Ser Asp Asn His Asp Ala Ser Gln Gly Tyr Ser Phe
100 105 110

Leu His Glu Val Asp Lys Glu Ala Glu Ile Thr Phe Asp Val Val Glu
115 120 125

Thr Phe Ile Arg Gly Trp Gly Asn Lys Pro Ile Glu Tyr Ile Lys Lys
130 135 140

Glu Arg Trp Thr Asp Ser Phe Lys Ile Leu Ala Tyr Leu Cys Gln Lys
145 150 155 160

Phe Leu Asp Leu His Lys Leu Thr Leu Ile Leu Asn Ala Val Ser Glu
165 170 175

Val Glu Leu Leu Asn Leu Ala Arg Thr Phe Lys Gly Lys Val Arg Arg
180 185 190

Ser Ser His Gly Thr Asn Ile Cys Arg Ile Arg Val Pro Ser Leu Gly
195 200 205

Pro Thr Phe Ile Ser Glu Gly Trp Ala Tyr Phe Lys Lys Leu Asp Ile
210 215 220

Leu Met Asp Arg Asn Phe Leu Leu Met Val Lys Asp Val Ile Ile Gly
225 230 235 240

Arg Met Gln Thr Val Leu Ser Met Val Cys Arg Ile Asp Asn Leu Phe
245 250 255

Ser Glu Gln Asp Ile Phe Ser Leu Leu Asn Ile Tyr Arg Ile Gly Asp
260 265 270

Lys Ile Val Glu Arg Gln Gly Asn Phe Ser Tyr Asp Leu Ile Lys Met
275 280 285

Val Glu Pro Ile Cys Asn Leu Lys Leu Met Lys Leu Ala Arg Glu Ser
290 295 300

Arg Pro Leu Val Pro Gln Phe Pro His Phe Glu Asn His Ile Lys Thr
305 310 315 320

Ser Val Asp Glu Gly Ala Lys Ile Asp Arg Gly Ile Arg Phe Leu His
325 330 335

Asp Gln Ile Met Ser Val Lys Thr Val Asp Leu Thr Leu Val Ile Tyr
340 345 350

Gly Ser Phe Arg His Trp Gly His Pro Phe Ile Asp Tyr Tyr Thr Gly
355 360 365

Leu Glu Lys Leu His Ser Gln Val Thr Met Lys Lys Asp Ile Asp Val
370 375 380

Ser Tyr Ala Lys Ala Leu Ala Ser Asp Leu Ala Arg Ile Val Leu Phe
385 390 395 400

Gln Gln Phe Asn Asp His Lys Lys Trp Phe Val Asn Gly Asp Leu Leu
405 410 415

Pro His Asp His Pro Phe Lys Ser His Val Lys Glu Asn Thr Trp Pro
420 425 430

Thr Ala Ala Gln Val Gln Asp Phe Gly Asp Lys Trp His Glu Leu Pro
435 440 445

Leu Ile Lys Cys Phe Glu Ile Pro Asp Leu Leu Asp Pro Ser Ile Ile
450 455 460

Tyr Ser Asp Lys Ser His Ser Met Asn Arg Ser Glu Val Leu Lys His
465 470 475 480

Val Arg Met Asn Pro Asn Thr Pro Ile Pro Ser Lys Lys Val Leu Gln
485 490 495

Thr Met Leu Asp Thr Lys Ala Thr Asn Trp Lys Glu Phe Leu Lys Glu
500 505 510

Ile Asp Glu Lys Gly Leu Asp Asp Asp Leu Ile Ile Gly Leu Lys
515 520 525

Gly Lys Glu Arg Glu Leu Lys Leu Ala Gly Arg Phe Phe Ser Leu Met
530 535 540

Ser Trp Lys Leu Arg Glu Tyr Phe Val Ile Thr Glu Tyr Leu Ile Lys
545 550 555 560

Thr His Phe Val Pro Met Phe Lys Gly Leu Thr Met Ala Asp Asp Leu
565 570 575

Thr Ala Val Ile Lys Lys Met Leu Asp Ser Ser Ser Gly Gln Gly Leu
580 585 590

Lys Ser Tyr Glu Ala Ile Cys Ile Ala Asn His Ile Asp Tyr Glu Lys
595 600 605

Trp Asn Asn His Gln Arg Lys Leu Ser Asn Gly Pro Val Phe Arg Val
610 615 620

Met Gly Gln Phe Leu Gly Tyr Pro Ser Leu Ile Glu Arg Thr His Glu
625 630 635 640

Phe Phe Glu Lys Ser Leu Ile Tyr Tyr Asn Gly Arg Pro Asp Leu Met
645 650 655

Arg Val His Asn Asn Thr Leu Ile Asn Ser Thr Ser Gln Arg Val Cys
660 665 670

Trp Gln Gly Gln Glu Gly Leu Glu Gly Leu Arg Gln Lys Gly Trp
675 680 685

Thr Ile Leu Asn Leu Leu Val Ile Gln Arg Glu Ala Lys Ile Arg Asn
690 695 700

Thr Ala Val Lys Val Leu Ala Gln Gly Asp Asn Gln Val Ile Cys Thr
705 710 715 720

Gln Tyr Lys Thr Lys Lys Ser Arg Asn Val Val Glu Leu Gln Gly Ala
725 730 735

Leu Asn Gln Met Val Ser Asn Asn Glu Lys Ile Met Thr Ala Ile Lys
740 745 750

Ile Gly Thr Gly Lys Leu Gly Leu Leu Ile Asn Asp Asp Glu Thr Met
755 760 765

Gln Ser Ala Asp Tyr Leu Asn Tyr Gly Lys Ile Pro Ile Phe Arg Gly
770 775 780

Val Ile Arg Gly Leu Glu Thr Lys Arg Trp Ser Arg Val Thr Cys Val
785 790 795 800

Thr Asn Asp Gln Ile Pro Thr Cys Ala Asn Ile Met Ser Ser Val Ser
805 810 815

Thr Asn Ala Leu Thr Val Ala His Phe Ala Glu Asn Pro Ile Asn Ala
820 825 830

Met Ile Gln Tyr Asn Tyr Phe Gly Thr Phe Ala Arg Leu Leu Leu Met
835 840 845

Met His Asp Pro Ala Leu Arg Gln Ser Leu Tyr Glu Val Gln Asp Lys
850 855 860

Ile Pro Gly Leu His Ser Ser Thr Phe Lys Tyr Ala Met Leu Tyr Leu
865 870 875 880

Asp Pro Ser Ile Gly Gly Val Ser Gly Met Ser Leu Ser Arg Phe Leu
885 890 895

Ile Arg Ala Phe Pro Asp Pro Val Thr Glu Ser Leu Ser Phe Trp Arg
900 905 910

Phe Ile His Val His Ala Arg Ser Glu His Leu Lys Glu Met Ser Ala
915 920 925

Val Phe Gly Asn Pro Glu Ile Ala Lys Phe Arg Ile Thr His Ile Asp
930 935 940

Lys Leu Val Glu Asp Pro Thr Ser Leu Asn Ile Ala Met Gly Met Ser
945 950 955 960

Pro Ala Asn Leu Leu Lys Thr Glu Val Lys Lys Cys Leu Ile Glu Ser
965 970 975

Arg Gln Thr Ile Arg Asn Gln Val Ile Lys Asp Ala Thr Ile Tyr Leu
980 985 990

Tyr His Glu Glu Asp Arg Leu Arg Ser Phe Leu Trp Ser Ile Asn Pro
995 1000 1005

Leu Phe Pro Arg Phe Leu Ser Glu Phe Lys Ser Gly Thr Phe Leu Gly
1010 1015 1020

Val Ala Asp Gly Leu Ile Ser Leu Phe Gln Asn Ser Arg Thr Ile Arg
1025 1030 1035 1040

Asn Ser Phe Lys Lys Tyr His Arg Glu Leu Asp Asp Leu Ile Val
1045 1050 1055

Arg Ser Glu Val Ser Ser Leu Thr His Leu Gly Lys Leu His Leu Arg
1060 1065 1070

Arg Gly Ser Cys Lys Met Trp Thr Cys Ser Ala Thr His Ala Asp Thr
1075 1080 1085

Leu Arg Tyr Lys Ser Trp Gly Arg Thr Val Ile Gly Thr Thr Val Pro
1090 1095 1100

His Pro Leu Glu Met Leu Gly Pro Gln His Arg Lys Glu Thr Pro Cys
1105 1110 1115 1120

Ala Pro Cys Asn Thr Ser Gly Phe Asn Tyr Val Ser Val His Cys Pro
1125 1130 1135

Asp Gly Ile His Asp Val Phe Ser Ser Arg Gly Pro Leu Pro Ala Tyr
1140 1145 1150

Leu Gly Ser Lys Thr Ser Glu Ser Thr Ser Ile Leu Gln Pro Trp Glu
1155 1160 1165

Arg Glu Ser Lys Val Pro Leu Ile Lys Arg Ala Thr Arg Leu Arg Asp
1170 1175 1180

Ala Ile Ser Trp Phe Val Glu Pro Asp Ser Lys Leu Ala Met Thr Ile
1185 1190 1195 1200

Leu Ser Asn Ile His Ser Leu Thr Gly Glu Glu Trp Thr Lys Arg Gln
1205 1210 1215

His Gly Phe Lys Arg Thr Gly Ser Ala Leu His Arg Phe Ser Thr Ser
1220 1225 1230

Arg Met Ser His Gly Gly Phe Ala Ser Gln Ser Thr Ala Ala Leu Thr
1235 1240 1245

Arg Leu Met Ala Thr Thr Asp Thr Met Arg Asp Leu Gly Asp Gln Asn
1250 1255 1260

Phe Asp Phe Leu Phe Gln Ala Thr Leu Leu Tyr Ala Gln Ile Thr Thr
1265 1270 1275 1280

Thr Val Ala Arg Asp Gly Trp Ile Thr Ser Cys Thr Asp His Tyr His
1285 1290 1295

Ile Ala Cys Lys Ser Cys Leu Arg Pro Ile Glu Glu Ile Thr Leu Asp
1300 1305 1310

Ser Ser Met Asp Tyr Thr Pro Pro Asp Val Ser His Val Leu Lys Thr
1315 1320 1325

Trp Arg Asn Gly Glu Gly Ser Trp Gly Gln Glu Ile Lys Gln Ile Tyr
1330 1335 1340

Pro Leu Glu Gly Asn Trp Lys Asn Leu Ala Pro Ala Glu Gln Ser Tyr
1345 1350 1355 1360

Gln Val Gly Arg Cys Ile Gly Phe Leu Tyr Gly Asp Leu Ala Tyr Arg
1365 1370 1375

Lys Ser Thr His Ala Glu Asp Ser Ser Leu Phe Pro Leu Ser Ile Gln
1380 1385 1390

Gly Arg Ile Arg Gly Arg Gly Phe Leu Lys Gly Leu Leu Asp Gly Leu
1395 1400 1405

Met Arg Ala Ser Cys Cys Gln Val Ile His Arg Arg Ser Leu Ala His
1410 1415 1420

Leu Lys Arg Pro Ala Asn Ala Val Tyr Gly Glu Leu Ile Tyr Leu Ile
1425 1430 1435 1440

Asp Lys Leu Ser Val Ser Pro Pro Phe Leu Ser Leu Thr Arg Ser Gly
1445 1450 1455

Pro Ile Arg Asp Glu Leu Glu Thr Ile Pro His Lys Ile Pro Thr Ser
1460 1465 1470

Tyr Pro Thr Ser Asn Arg Asp Met Gly Val Ile Val Arg Asn Tyr Phe
1475 1480 1485

Lys Tyr Gln Cys Arg Leu Ile Glu Lys Gly Lys Tyr Arg Ser His Tyr
1490 1495 1500

Ser Gln Leu Trp Leu Phe Ser Asp Val Leu Ser Ile Asp Phe Ile Gly
1505 1510 1515 1520

Pro Phe Ser Ile Ser Thr Thr Leu Leu Gln Ile Leu Tyr Lys Pro Phe
1525 1530 1535

Leu Ser Gly Lys Asp Lys Asn Glu Leu Arg Glu Leu Ala Asn Leu Ser
1540 1545 1550

Ser Leu Leu Arg Ser Gly Glu Gly Trp Glu Asp Ile His Val Lys Phe
1555 1560 1565

Phe Thr Lys Asp Ile Leu Leu Cys Pro Glu Glu Ile Arg His Ala Cys
1570 1575 1580

Lys Phe Gly Ile Ala Lys Asp Asn Asn Lys Asp Met Ser Tyr Pro Pro
1585 1590 1595 1600

Trp Gly Arg Glu Ser Arg Gly Thr Ile Thr Thr Ile Pro Val Tyr Tyr
1605 1610 1615

Thr Thr Thr Pro Tyr Pro Lys Met Leu Glu Met Pro Pro Arg Ile Gln
1620 1625 1630

Asn Pro Leu Leu Ser Gly Ile Arg Leu Gly Gln Leu Pro Thr Gly Ala
1635 1640 1645

His Tyr Lys Ile Arg Ser Ile Leu His Gly Met Gly Ile His Tyr Arg
1650 1655 1660

Asp Phe Leu Ser Cys Gly Asp Gly Ser Gly Gly Met Thr Ala Ala Leu
1665 1670 1675 1680

Leu Arg Glu Asn Val His Ser Arg Gly Ile Phe Asn Ser Leu Leu Glu
1685 1690 1695

Leu Ser Gly Ser Val Met Arg Gly Ala Ser Pro Glu Pro Pro Ser Ala
1700 1705 1710

Leu Glu Thr Leu Gly Gly Asp Lys Ser Arg Cys Val Asn Gly Glu Thr
1715 1720 1725

Cys Trp Glu Tyr Pro Ser Asp Leu Cys Asp Pro Arg Thr Trp Asp Tyr
1730 1735 1740

Phe Leu Arg Leu Lys Ala Gly Leu Gly Leu Gln Ile Asp Leu Ile Val
1745 1750 1755 1760

Met Asp Met Glu Val Arg Asp Ser Ser Thr Ser Leu Lys Ile Glu Thr
1765 1770 1775

Asn Val Arg Asn Tyr Val His Arg Ile Leu Asp Glu Gln Gly Val Leu
1780 1785 1790

Ile Tyr Lys Thr Tyr Gly Thr Tyr Ile Cys Glu Ser Glu Lys Asn Ala
1795 1800 1805

Val Thr Ile Leu Gly Pro Met Phe Lys Thr Val Asp Leu Val Gln Thr
1810 1815 1820

Glu Phe Ser Ser Ser Gln Thr Ser Glu Val Tyr Met Val Cys Lys Gly
1825 1830 1835 1840

Leu Lys Leu Ile Asp Glu Pro Asn Pro Asp Trp Ser Ser Ile Asn
1845 1850 1855

Glu Ser Trp Lys Asn Leu Tyr Ala Phe Gln Ser Ser Glu Gln Glu Phe
1860 1865 1870

Ala Arg Ala Lys Lys Val Ser Thr Tyr Phe Thr Leu Thr Gly Ile Pro
1875 1880 1885

Ser Gln Phe Ile Pro Asp Pro Phe Val Asn Ile Glu Thr Met Leu Gln
1890 1895 1900

Ile Phe Gly Val Pro Thr Gly Val Ser His Ala Ala Ala Leu Lys Ser
1905 1910 1915 1920

Ser Asp Arg Pro Ala Asp Leu Leu Thr Ile Ser Leu Phe Tyr Met Ala
1925 1930 1935

Ile Ile Ser Tyr Tyr Asn Ile Asn His Ile Arg Val Gly Pro Ile Pro
1940 1945 1950

Pro Asn Pro Pro Ser Asp Gly Ile Ala Gln Asn Val Gly Ile Ala Ile
1955 1960 1965

Thr Gly Ile Ser Phe Trp Leu Ser Leu Met Glu Lys Asp Ile Pro Leu
1970 1975 1980

Tyr Gln Gln Cys Leu Ala Val Ile Gln Gln Ser Phe Pro Ile Arg Trp
1985 1990 1995 2000

Glu Ala Val Ser Val Lys Gly Gly Tyr Lys Gln Lys Trp Ser Thr Arg
2005 2010 2015

Gly Asp Gly Leu Pro Lys Asp Thr Arg Thr Ser Asp Ser Leu Ala Pro
2020 2025 2030

Ile Gly Asn Trp Ile Arg Ser Leu Glu Leu Val Arg Asn Gln Val Arg
2035 2040 2045

Leu Asn Pro Phe Asn Glu Ile Leu Phe Asn Gln Leu Cys Arg Thr Val
2050 2055 2060

Asp Asn His Leu Lys Trp Ser Asn Leu Arg Arg Asn Thr Gly Met Ile
2065 2070 2075 2080

Glu Trp Ile Asn Arg Arg Ile Ser Lys Glu Asp Arg Ser Ile Leu Met
2085 2090 2095

Leu Lys Ser Asp Leu His Glu Glu Asn Ser Trp Arg Asp
2100 2105

<210> 51
<211> 1753
<212> PRT
<213> Vesicular stomatitis virus

<220>
<221> MOD_RES
<222> (1)..(1753)
<223> "Xaa" represents any, other or unknown amino acid

<400> 51
His Trp Gly His Pro Phe Ile Asp Tyr Tyr Ala Gly Leu Glu Lys Leu
1 5 10 15

His Ser Gln Val Thr Xaa Lys Lys Asp Ile Asp Val Ser Tyr Ala Lys
20 25 30

Ala Leu Ala Ser Asp Leu Ala Arg Ile Val Leu Phe Gln Gln Phe Asn
35 40 45

Asp His Xaa Lys Trp Phe Val Asn Gly Asp Leu Leu Pro His Asp His
50 55 60

Pro Phe Lys Ser His Val Lys Glu Asn Thr Trp Pro Thr Ala Ala Gln
65 70 75 80

Val Gln Asp Phe Gly Asp Lys Trp His Glu Leu Pro Leu Ile Lys Cys
85 90 95

Phe Glu Ile Pro Asp Leu Leu Asp Pro Ser Ile Ile Tyr Ser Asp Lys
100 105 110

Ser His Ser Met Asn Arg Ser Glu Val Leu Lys His Val Arg Met Asn
115 120 125

Pro Asn Thr Pro Ile Pro Ser Lys Lys Val Leu Gln Thr Met Leu Asp
130 135 140

Thr Lys Ala Thr Asn Trp Lys Glu Phe Leu Lys Glu Ile Asp Glu Lys
145 150 155 160

Gly Leu Asp Asp Asp Asp Leu Ile Ile Gly Leu Lys Gly Lys Glu Arg
165 170 175

Glu Leu Lys Leu Ala Gly Arg Phe Phe Ser Leu Met Ser Trp Lys Leu
180 185 190

Arg Glu Tyr Phe Val Ile Thr Glu Tyr Leu Ile Lys Thr His Phe Val
195 200 205

Pro Met Phe Lys Gly Leu Thr Met Ala Asp Asp Leu Thr Ala Val Ile
210 215 220

Lys Lys Met Leu Asp Ser Ser Ser Gly Gln Gly Leu Lys Ser Tyr Glu
225 230 235 240

Ala Ile Cys Ile Ala Asn His Ile Asp Tyr Glu Lys Trp Asn Asn His
245 250 255

Gln Arg Lys Leu Ser Asn Gly Pro Val Phe Arg Val Met Gly Gln Phe
260 265 270

Leu Gly Tyr Pro Ser Leu Ile Glu Arg Thr His Glu Phe Phe Glu Lys
275 280 285

Ser Leu Ile Tyr Tyr Asn Gly Arg Pro Asp Leu Met Arg Val His Asn
290 295 300

Asn Thr Leu Ile Asn Ser Thr Ser Gln Arg Val Cys Trp Gln Gly Gln
305 310 315 320

Glu Gly Gly Leu Glu Gly Leu Arg Gln Lys Gly Trp Ser Ile Leu Asn
325 330 335

Leu Leu Val Ile Gln Arg Glu Ala Lys Ile Arg Asn Thr Ala Val Lys
340 345 350

Val Leu Ala Gln Gly Asp Asn Gln Val Ile Cys Thr Gln Tyr Lys Thr
355 360 365

Lys Lys Ser Arg Asn Val Val Glu Leu Gln Gly Ala Leu Asn Gln Met
370 375 380

Val Ser Asn Asn Glu Lys Ile Met Thr Ala Ile Lys Ile Gly Thr Gly
385 390 395 400

Lys Leu Gly Leu Leu Ile Asn Asp Asp Glu Thr Met Gln Ser Ala Asp
405 410 415

Tyr Leu Asn Tyr Gly Lys Ile Pro Ile Phe Arg Gly Val Ile Arg Gly
420 425 430

Leu Glu Thr Lys Arg Trp Ser Arg Val Thr Cys Val Thr Asn Asp Gln
435 440 445

Ile Pro Thr Cys Ala Asn Ile Met Ser Ser Val Ser Thr Asn Ala Leu
450 455 460

Thr Val Ala His Phe Ala Glu Asn Pro Ile Asn Ala Met Ile Gln Tyr
465 470 475 480

Asn Tyr Phe Gly Thr Phe Ala Arg Leu Leu Met Met His Asp Pro
485 490 495

Ala Leu Arg Gln Ser Leu Tyr Glu Val Gln Asp Lys Ile Pro Gly Leu
500 505 510

His Ser Ser Thr Phe Lys Tyr Ala Met Leu Tyr Leu Asp Pro Ser Ile
515 520 525

Gly Gly Val Ser Gly Met Ser Leu Ser Arg Phe Leu Ile Arg Ala Phe
530 535 540

Pro Asp Pro Val Thr Glu Ser Leu Ser Phe Trp Arg Phe Ile His Val
545 550 555 560

His Ala Arg Ser Glu His Leu Lys Glu Met Ser Ala Val Phe Gly Asn
565 570 575

Pro Glu Ile Ala Lys Phe Arg Ile Thr His Ile Asp Lys Leu Val Glu
580 585 590

Asp Pro Thr Ser Leu Asn Ile Ala Met Gly Met Ser Pro Ala Asn Leu
595 600 605

Leu Lys Thr Glu Val Lys Lys Cys Leu Ile Glu Ser Arg Gln Thr Ile
610 615 620

Arg Asn Gln Val Ile Lys Asp Ala Thr Ile Tyr Leu Tyr His Glu Glu
625 630 635 640

Asp Arg Leu Arg Ser Phe Leu Trp Ser Ile Asn Pro Leu Phe Pro Arg
645 650 655

Phe Leu Ser Glu Phe Lys Ser Gly Thr Phe Leu Gly Val Ala Asp Gly
660 665 670

Leu Ile Ser Leu Phe Gln Asn Ser Arg Thr Ile Arg Asn Ser Phe Lys
675 680 685

Lys Lys Tyr His Arg Glu Leu Asp Asp Leu Ile Val Arg Ser Glu Val
690 695 700

Ser Ser Leu Thr His Leu Gly Lys Leu His Leu Arg Arg Gly Ser Cys
705 710 715 720

Lys Met Trp Thr Cys Ser Ala Thr His Ala Asp Thr Leu Arg Tyr Lys
725 730 735

Ser Trp Gly Arg Thr Val Ile Gly Thr Thr Val Pro His Pro Leu Glu
740 745 750

Met Leu Gly Pro Gln His Arg Lys Glu Thr Pro Cys Ala Pro Cys Asn
755 760 765

Thr Ser Gly Phe Asn Tyr Val Ser Val His Cys Pro Asp Gly Ile His
770 775 780

Asp Val Phe Ser Ser Arg Gly Pro Leu Pro Ala Tyr Leu Gly Ser Lys
785 790 795 800

Thr Ser Glu Ser Thr Ser Ile Leu Gln Pro Trp Glu Arg Glu Ser Lys
805 810 815

Val Pro Leu Ile Lys Arg Ala Thr Arg Leu Arg Asp Ala Ile Ser Trp
820 825 830

Phe Val Glu Pro Asp Ser Lys Leu Ala Met Thr Ile Leu Ser Asn Ile
835 840 845

His Ser Leu Thr Gly Glu Glu Trp Thr Lys Arg Gln His Gly Phe Lys
850 855 860

Arg Thr Gly Ser Ala Leu His Arg Phe Ser Thr Ser Arg Met Ser His
865 870 875 880

Gly Gly Phe Ala Ser Gln Ser Thr Ala Ala Leu Thr Arg Leu Met Ala
885 890 895

Thr Thr Asp Thr Met Arg Asp Leu Gly Asp Gln Asn Phe Asp Phe Leu
900 905 910

Phe Gln Ala Thr Leu Leu Tyr Ala Gln Ile Thr Thr Val Ala Arg
915 920 925

Asp Gly Trp Ile Thr Ser Cys Thr Asp His Tyr His Ile Ala Cys Lys
930 935 940

Ser Cys Leu Arg Pro Ile Glu Glu Ile Thr Leu Asp Ser Ser Met Asp
945 950 955 960

Tyr Thr Pro Pro Asp Val Ser His Val Leu Lys Thr Trp Arg Asn Gly
965 970 975

Glu Gly Ser Trp Gly Gln Glu Ile Lys Gln Ile Tyr Pro Leu Glu Gly
980 985 990

Asn Trp Lys Asn Leu Ala Pro Ala Glu Gln Ser Tyr Gln Val Gly Arg
995 1000 1005

Cys Ile Gly Phe Leu Tyr Gly Asp Leu Ala Tyr Arg Lys Ser Thr His
1010 1015 1020

Ala Glu Asp Ser Ser Leu Phe Pro Leu Ser Ile Gln Gly Arg Ile Arg
1025 1030 1035 1040

Gly Arg Gly Phe Leu Lys Gly Leu Leu Asp Gly Leu Met Arg Ala Ser
1045 1050 1055

Cys Cys Gln Val Ile His Arg Arg Ser Leu Ala His Leu Lys Arg Pro
1060 1065 1070

Ala Asn Ala Val Tyr Gly Leu Ile Tyr Leu Ile Asp Lys Leu Ser
1075 1080 1085

Val Ser Pro Pro Phe Leu Ser Leu Thr Arg Ser Gly Pro Ile Arg Asp
1090 1095 1100

Glu Leu Glu Thr Ile Pro His Lys Ile Pro Thr Ser Tyr Pro Thr Ser
1105 1110 1115 1120

Asn Arg Asp Met Gly Val Ile Val Arg Asn Tyr Phe Lys Tyr Gln Cys
1125 1130 1135

Arg Leu Ile Glu Lys Gly Lys Tyr Arg Ser His Tyr Ser Gln Leu Trp
1140 1145 1150

Leu Phe Ser Asp Val Leu Ser Ile Asp Phe Ile Gly Pro Phe Ser Ile
1155 1160 1165

Ser Thr Thr Leu Leu Gln Ile Leu Tyr Lys Pro Phe Leu Ser Gly Lys
1170 1175 1180

Asp Lys Asn Glu Leu Arg Glu Leu Ala Asn Leu Ser Ser Leu Leu Arg
1185 1190 1195 1200

Ser Gly Glu Gly Trp Glu Asp Ile His Val Lys Phe Phe Thr Lys Asp
1205 1210 1215

Ile Leu Leu Cys Pro Glu Glu Ile Arg His Ala Cys Lys Phe Gly Ile
1220 1225 1230

Ala Lys Asp Asn Asn Lys Asp Met Ser Tyr Pro Pro Trp Gly Arg Glu
1235 1240 1245

Ser Arg Gly Thr Ile Thr Thr Ile Pro Val Tyr Tyr Thr Thr Thr Pro
1250 1255 1260

Tyr Pro Lys Met Leu Glu Met Pro Pro Arg Ile Gln Asn Pro Leu Leu
1265 1270 1275 1280

Ser Gly Ile Arg Leu Gly Gln Leu Pro Thr Gly Ala His Tyr Lys Ile
1285 1290 1295

Arg Ser Ile Leu His Gly Met Gly Ile His Tyr Arg Asp Phe Leu Ser
1300 1305 1310

Cys Gly Asp Gly Ser Gly Gly Met Thr Ala Ala Leu Leu Arg Glu Asn
1315 1320 1325

Val His Ser Arg Gly Ile Phe Asn Ser Leu Leu Glu Leu Ser Gly Ser
1330 1335 1340

Val Met Arg Gly Ala Ser Pro Glu Pro Pro Ser Ala Leu Glu Thr Leu
1345 1350 1355 1360

Gly Gly Asp Lys Ser Arg Cys Val Asn Gly Glu Thr Cys Trp Glu Tyr
1365 1370 1375

Pro Ser Asp Leu Cys Asp Pro Arg Thr Trp Asp Tyr Phe Leu Arg Leu
1380 1385 1390

Lys Ala Gly Leu Gly Leu Gln Ile Asp Leu Ile Val Met Asp Met Glu
1395 1400 1405

Val Arg Asp Ser Ser Thr Ser Leu Lys Ile Glu Thr Asn Val Arg Asn
1410 1415 1420

Tyr Val His Arg Ile Leu Asp Glu Gln Gly Val Leu Ile Tyr Lys Thr
1425 1430 1435 1440

Tyr Gly Thr Tyr Ile Cys Glu Ser Glu Lys Asn Ala Val Thr Ile Leu
1445 1450 1455

Gly Pro Met Phe Lys Thr Val Asp Leu Val Gln Thr Glu Phe Ser Ser
1460 1465 1470

Ser Gln Thr Ser Glu Val Tyr Met Val Cys Lys Gly Leu Lys Lys Leu
1475 1480 1485

Ile Asp Glu Pro Asn Pro Asp Trp Ser Ser Ile Asn Glu Ser Trp Lys
1490 1495 1500

Asn Leu Tyr Ala Phe Gln Ser Ser Glu Gln Glu Phe Ala Arg Ala Lys
1505 1510 1515 1520

Lys Val Ser Thr Tyr Phe Thr Leu Thr Gly Ile Pro Ser Gln Phe Ile
1525 1530 1535

Pro Asp Pro Phe Val Asn Ile Glu Thr Met Leu Gln Ile Phe Gly Val
1540 1545 1550

Pro Thr Gly Val Ser His Ala Ala Ala Leu Lys Ser Ser Asp Arg Pro
1555 1560 1565

Ala Asp Leu Leu Thr Ile Ser Leu Phe Tyr Met Ala Ile Ile Ser Tyr
1570 1575 1580

Tyr Asn Ile Asn His Ile Arg Val Gly Pro Ile Pro Pro Asn Pro Pro
1585 1590 1595 1600

Ser Asp Gly Ile Ala Gln Asn Val Gly Ile Ala Ile Thr Gly Ile Ser
1605 1610 1615

Phe Trp Leu Ser Leu Met Glu Lys Asp Ile Pro Leu Tyr Gln Gln Cys
1620 1625 1630

Leu Ala Val Ile Gln Gln Ser Phe Pro Ile Arg Trp Glu Ala Val Ser
1635 1640 1645

Val Lys Gly Gly Tyr Lys Gln Lys Trp Ser Thr Arg Gly Asp Gly Leu
1650 1655 1660

Pro Lys Asp Thr Arg Ile Ser Asp Ser Leu Ala Pro Ile Gly Asn Trp
1665 1670 1675 1680

Ile Arg Ser Leu Glu Leu Val Arg Asn Gln Val Arg Leu Asn Pro Phe
1685 1690 1695

Asn Glu Ile Leu Phe Asn Gln Leu Cys Arg Thr Val Asp Asn His Leu
1700 1705 1710

Lys Trp Ser Asn Leu Arg Lys Asn Thr Gly Met Ile Glu Trp Ile Asn
1715 1720 1725

Arg Arg Ile Ser Lys Glu Asp Arg Ser Ile Leu Met Leu Lys Ser Asp
1730 1735 1740

Leu His Glu Glu Asn Ser Trp Arg Asp
1745 1750

<210> 52
<211> 2109
<212> PRT
<213> Vesicular stomatitis virus

<220>
<221> MOD_RES
<222> (1)..(2109)
<223> "Xaa" represents any, other or unknown amino acid

<400> 52
Met Glu Val His Asp Phe Glu Thr Asp Glu Phe Asn Asp Phe Asn Glu
1 5 10 15

Asp Asp Tyr Ala Thr Arg Glu Phe Leu Asn Pro Asp Glu Arg Met Thr
20 25 30

Tyr Leu Asn His Ala Asp Tyr Asn Leu Asn Ser Pro Leu Ile Ser Asp
35 40 45

Asp Ile Asp Asn Leu Ile Arg Lys Phe Asn Ser Leu Pro Ile Pro Ser
50 55 60

Met Trp Asp Ser Lys Asn Trp Asp Gly Val Leu Glu Met Leu Thr Ser
65 70 75 80

Cys Gln Ala Asn Pro Ile Ser Thr Ser Gln Met His Lys Trp Met Gly
85 90 95

Ser Trp Leu Met Ser Asp Asn His Asp Ala Ser Gln Gly Tyr Ser Phe
100 105 110

Leu His Glu Val Asp Lys Glu Ala Glu Ile Thr Phe Asp Val Val Glu
115 120 125

Thr Phe Ile Arg Gly Trp Gly Asn Lys Pro Ile Glu Tyr Ile Lys Lys
130 135 140

Glu Arg Trp Thr Asp Ser Phe Lys Ile Leu Ala Tyr Leu Cys Gln Lys
145 150 155 160

Phe Leu Asp Leu His Lys Leu Thr Leu Ile Leu Asn Ala Val Ser Glu
165 170 175

Val Glu Leu Leu Asn Leu Ala Arg Thr Phe Lys Gly Lys Val Arg Arg
180 185 190

Ser Ser His Gly Thr Asn Ile Cys Arg Leu Arg Val Pro Ser Leu Gly
195 200 205

Pro Thr Phe Ile Ser Glu Gly Trp Ala Tyr Phe Lys Lys Leu Asp Ile
210 215 220

Leu Met Asp Arg Asn Phe Leu Leu Met Val Lys Asp Val Ile Ile Gly
225 230 235 240

Arg Met Gln Thr Val Leu Ser Met Val Cys Arg Ile Asp Asn Leu Phe
245 250 255

Ser Glu Gln Asp Ile Phe Ser Leu Leu Asn Ile Tyr Arg Ile Gly Asp
260 265 270

Lys Ile Val Glu Arg Gln Gly Asn Phe Ser Tyr Asp Leu Ile Lys Met
275 280 285

Val Glu Pro Ile Cys Asn Leu Arg Leu Met Lys Leu Ala Arg Glu Ser
290 295 300

Arg Pro Leu Val Pro Gln Phe Pro His Phe Glu Asn His Ile Lys Thr
305 310 315 320

Ser Val Asp Glu Gly Ala Lys Ile Asp Arg Gly Ile Arg Phe Leu His
325 330 335

Asp Gln Ile Met Ser Val Lys Thr Val Asp Leu Thr Leu Val Ile Tyr
340 345 350

Gly Ser Phe Arg His Trp Gly His Pro Phe Ile Asp Tyr Tyr Ala Gly
355 360 365

Leu Glu Lys Leu His Ser Gln Val Thr Met Lys Lys Asp Ile Asp Val
370 375 380

Ser Tyr Ala Lys Ala Leu Ala Ser Asp Leu Ala Arg Ile Val Leu Phe
385 390 395 400

Gln Gln Phe Asn Asp His Lys Lys Trp Phe Val Asn Gly Asp Leu Leu
405 410 415

Pro His Asp His Pro Phe Lys Ser His Val Lys Glu Asn Thr Trp Pro
420 425 430

Thr Ala Ala Gln Val Gln Asp Phe Gly Asp Lys Trp His Glu Leu Pro
435 440 445

Leu Ile Lys Cys Phe Glu Ile Pro Asp Leu Leu Asp Pro Ser Ile Ile
450 455 460

Tyr Ser Asp Lys Ser His Ser Met Asn Arg Ser Glu Val Leu Lys His
465 470 475 480

Val Arg Met Asn Pro Asn Thr Pro Ile Pro Ser Lys Lys Val Leu Gln
485 490 495

Thr Met Leu Asp Thr Lys Ala Thr Asn Trp Lys Glu Phe Leu Lys Glu
500 505 510

Ile Asp Glu Lys Gly Leu Asp Asp Asp Leu Ile Ile Gly Leu Lys
515 520 525

Gly Lys Glu Arg Glu Leu Lys Leu Ala Gly Arg Phe Phe Ser Leu Met
530 535 540

Ser Trp Lys Leu Arg Glu Tyr Phe Val Ile Thr Glu Tyr Leu Ile Lys
545 550 555 560

Thr His Phe Val Pro Met Phe Lys Gly Leu Thr Met Ala Asp Asp Leu
565 570 575

Thr Ala Val Ile Lys Lys Met Leu Asp Ser Ser Ser Gly Gln Gly Leu
580 585 590

Lys Ser Tyr Glu Ala Ile Cys Ile Ala Asn His Ile Asp Tyr Glu Lys
595 600 605

Trp Asn Asn His Gln Arg Lys Leu Ser Asn Gly Pro Val Phe Arg Val
610 615 620

Met Gly Gln Phe Leu Gly Tyr Pro Ser Leu Ile Glu Arg Thr His Glu
625 630 635 640

Phe Phe Glu Lys Ser Leu Ile Tyr Tyr Asn Gly Arg Pro Asp Leu Met
645 650 655

Arg Val His Asn Asn Thr Leu Ile Asn Ser Thr Ser Gln Arg Val Cys
660 665 670

Trp Gln Gly Gln Glu Gly Leu Glu Gly Leu Arg Gln Lys Gly Trp
675 680 685

Ser Ile Leu Asn Leu Leu Val Ile Gln Arg Glu Ala Lys Ile Arg Asn
690 695 700

Thr Ala Val Lys Val Leu Ala Gln Gly Asp Asn Gln Val Ile Cys Thr
705 710 715 720

Gln Tyr Lys Thr Lys Ser Arg Asn Val Val Glu Leu Gln Gly Ala
725 730 735

Leu Asn Gln Met Val Ser Asn Asn Glu Lys Ile Met Thr Ala Ile Lys
740 745 750

Ile Gly Thr Gly Lys Leu Gly Leu Leu Ile Asn Asp Asp Glu Thr Met
755 760 765

Gln Ser Ala Asp Tyr Leu Asn Tyr Gly Lys Ile Pro Ile Phe Arg Gly
770 775 780

Val Ile Arg Gly Leu Glu Thr Lys Arg Trp Ser Arg Val Thr Cys Val
785 790 795 800

Thr Asn Asp Gln Ile Pro Thr Cys Ala Asn Ile Met Ser Ser Val Ser
805 810 815

Thr Asn Ala Leu Thr Val Ala His Phe Ala Glu Asn Pro Ile Asn Ala
820 825 830

Met Ile Gln Tyr Asn Tyr Phe Gly Thr Phe Ala Arg Leu Leu Leu Met
835 840 845

Met His Asp Pro Ala Leu Arg Gln Ser Leu Tyr Glu Val Gln Asp Lys
850 855 860

Ile Pro Gly Leu His Ser Ser Thr Phe Lys Tyr Ala Met Leu Tyr Leu
865 870 875 880

Asp Pro Ser Ile Gly Gly Val Ser Gly Met Ser Leu Ser Arg Phe Leu
885 890 895

Ile Arg Ala Phe Pro Asp Pro Val Thr Glu Ser Leu Ser Phe Trp Arg
900 905 910

Phe Ile His Val His Ala Arg Ser Glu His Leu Lys Glu Met Ser Ala
915 920 925

Val Phe Gly Asn Pro Glu Ile Ala Lys Phe Arg Ile Thr His Ile Asp
930 935 940

Lys Leu Val Glu Asp Pro Thr Ser Leu Asn Ile Ala Met Gly Met Ser
945 950 955 960

Pro Ala Asn Leu Leu Lys Thr Glu Val Lys Lys Cys Leu Ile Glu Ser
965 970 975

Arg Gln Thr Ile Arg Asn Gln Val Ile Lys Asp Ala Thr Ile Tyr Leu
980 985 990

Tyr His Glu Glu Asp Arg Leu Arg Ser Phe Leu Trp Ser Ile Asn Pro
995 1000 1005

Leu Phe Pro Arg Phe Leu Ser Glu Phe Lys Ser Gly Thr Phe Leu Gly
1010 1015 1020

Val Ala Asp Gly Leu Ile Ser Leu Phe Gln Asn Ser Arg Thr Ile Arg
1025 1030 1035 1040

Asn Ser Phe Lys Lys Tyr His Arg Glu Leu Asp Asp Leu Ile Val
1045 1050 1055

Arg Ser Glu Val Ser Ser Leu Thr His Leu Gly Lys Leu His Leu Arg
1060 1065 1070

Arg Gly Ser Cys Lys Met Trp Thr Cys Ser Ala Thr His Ala Asp Thr
1075 1080 1085

Leu Arg Tyr Lys Ser Trp Gly Arg Thr Val Ile Gly Thr Thr Val Pro
1090 1095 1100

His Pro Leu Glu Met Leu Gly Pro Gln His Arg Lys Glu Thr Pro Cys
1105 1110 1115 1120

Ala Pro Cys Asn Thr Ser Gly Phe Asn Tyr Val Ser Val His Cys Pro
1125 1130 1135

Asp Gly Ile His Asp Val Phe Ser Ser Arg Gly Pro Leu Pro Ala Tyr
1140 1145 1150

Leu Gly Ser Lys Thr Ser Glu Ser Thr Ser Ile Leu Gln Pro Trp Glu
1155 1160 1165

Arg Glu Ser Lys Val Pro Leu Ile Lys Arg Ala Thr Arg Leu Arg Asp
1170 1175 1180

Ala Ile Ser Trp Phe Val Glu Pro Asp Ser Lys Leu Ala Met Thr Ile
1185 1190 1195 1200

Leu Ser Asn Ile His Ser Leu Thr Gly Glu Glu Trp Thr Lys Arg Gln
1205 1210 1215

His Gly Phe Lys Arg Thr Gly Ser Ala Leu His Arg Phe Ser Thr Ser
1220 1225 1230

Arg Met Ser His Gly Gly Phe Ala Ser Gln Ser Thr Ala Ala Leu Thr
1235 1240 1245

Arg Leu Met Ala Thr Thr Asp Thr Met Arg Asp Leu Gly Asp Gln Asn
1250 1255 1260

Phe Asp Phe Leu Phe Xaa Ala Thr Leu Leu Tyr Ala Xaa Ile Thr Thr
1265 1270 1275 1280

Thr Val Ala Arg Asp Gly Trp Ile Thr Ser Cys Thr Asp His Tyr His
1285 1290 1295

Ile Ala Cys Lys Ser Cys Leu Arg Pro Ile Glu Glu Ile Thr Leu Asp
1300 1305 1310

Ser Ser Met Asp Tyr Thr Pro Pro Asp Val Ser His Val Leu Lys Thr
1315 1320 1325

Trp Arg Asn Gly Glu Gly Ser Trp Gly Gln Glu Ile Lys Gln Ile Tyr
1330 1335 1340

Pro Leu Glu Gly Asn Trp Lys Asn Leu Ala Pro Ala Glu Gln Ser Tyr
1345 1350 1355 1360

Gln Val Gly Arg Cys Ile Gly Phe Leu Tyr Gly Asp Leu Ala Tyr Arg
1365 1370 1375

Lys Ser Thr His Ala Glu Asp Ser Ser Leu Phe Pro Leu Ser Ile Gln
1380 1385 1390

Gly Arg Ile Arg Gly Arg Gly Phe Leu Lys Gly Leu Leu Asp Gly Leu
1395 1400 1405

Met Arg Ala Ser Cys Cys Gln Val Ile His Arg Arg Ser Leu Ala His
1410 1415 1420

Leu Lys Arg Pro Ala Asn Ala Val Tyr Gly Gly Leu Ile Tyr Leu Ile
1425 1430 1435 1440

Asp Lys Leu Ser Val Ser Pro Pro Phe Leu Ser Leu Thr Arg Ser Gly
1445 1450 1455

Pro Ile Arg Asp Glu Leu Glu Thr Ile Pro His Lys Ile Pro Thr Ser
1460 1465 1470

Tyr Pro Thr Ser Asn Arg Asp Met Gly Val Ile Val Arg Asn Tyr Phe
1475 1480 1485

Lys Tyr Gln Cys Arg Leu Ile Glu Lys Gly Lys Tyr Arg Ser His Tyr
1490 1495 1500

Ser Gln Leu Trp Leu Phe Ser Asp Val Leu Ser Ile Asp Phe Ile Gly
1505 1510 1515 1520

Pro Phe Ser Ile Ser Thr Thr Leu Leu Gln Ile Leu Tyr Lys Pro Phe
1525 1530 1535

Leu Ser Gly Lys Asp Lys Asn Glu Leu Arg Glu Leu Ala Asn Leu Ser
1540 1545 1550

Ser Leu Leu Arg Ser Gly Glu Gly Trp Glu Asp Ile His Val Lys Phe
1555 1560 1565

Phe Thr Lys Asp Ile Leu Leu Cys Pro Glu Glu Ile Arg His Ala Cys
1570 1575 1580

Lys Phe Gly Ile Ala Lys Asp Asn Asn Lys Asp Met Ser Tyr Pro Pro
1585 1590 1595 1600

Trp Gly Arg Glu Ser Arg Gly Thr Ile Thr Thr Ile Pro Val Tyr Tyr
1605 1610 1615

Thr Thr Thr Pro Tyr Pro Lys Met Leu Glu Met Pro Pro Arg Ile Gln
1620 1625 1630

Asn Pro Leu Leu Ser Gly Ile Arg Leu Gly Gln Leu Pro Thr Gly Ala
1635 1640 1645

His Tyr Lys Ile Arg Ser Ile Leu His Gly Met Gly Ile His Tyr Arg
1650 1655 1660

Asp Phe Leu Ser Cys Gly Asp Gly Ser Gly Gly Met Thr Ala Ala Leu
1665 1670 1675 1680

Leu Arg Glu Asn Val His Ser Arg Gly Ile Phe Asn Ser Leu Leu Glu
1685 1690 1695

Leu Ser Gly Ser Val Met Arg Gly Ala Ser Pro Glu Pro Pro Ser Ala
1700 1705 1710

Leu Glu Thr Leu Gly Gly Asp Lys Ser Arg Cys Val Asn Gly Glu Thr
1715 1720 1725

Cys Trp Glu Tyr Pro Ser Asp Leu Cys Asp Pro Arg Thr Trp Asp Tyr
1730 1735 1740

Phe Leu Arg Leu Lys Ala Gly Leu Gly Leu Gln Ile Asp Leu Ile Val
1745 1750 1755 1760

Met Asp Met Glu Val Arg Asp Ser Ser Thr Ser Leu Lys Ile Glu Thr
1765 1770 1775

Asn Val Arg Asn Tyr Val His Arg Ile Leu Asp Glu Gln Gly Val Leu
1780 1785 1790

Ile Tyr Lys Thr Tyr Gly Thr Tyr Ile Cys Glu Ser Glu Lys Asn Ala
1795 1800 1805

Val Thr Ile Leu Gly Pro Met Phe Lys Thr Val Asp Leu Val Gln Thr
1810 1815 1820

Glu Phe Ser Ser Ser Gln Thr Ser Glu Val Tyr Met Val Cys Lys Gly
1825 1830 1835 1840

Leu Lys Lys Leu Ile Asp Glu Pro Asn Pro Asp Trp Ser Ser Ile Asn
1845 1850 1855

Glu Ser Trp Lys Asn Leu Tyr Ala Phe Gln Ser Ser Glu Gln Glu Phe
1860 1865 1870

Ala Arg Ala Lys Lys Val Ser Thr Tyr Phe Thr Leu Thr Gly Ile Pro
1875 1880 1885

Ser Gln Phe Ile Pro Asp Pro Phe Val Asn Ile Glu Thr Met Leu Gln
1890 1895 1900

Ile Phe Gly Val Pro Thr Gly Val Ser His Ala Ala Ala Leu Lys Ser
1905 1910 1915 1920

Ser Asp Arg Pro Ala Asp Leu Leu Thr Ile Ser Leu Phe Tyr Met Ala
1925 1930 1935

Ile Ile Ser Tyr Tyr Asn Ile Asn His Ile Arg Val Gly Pro Ile Pro
1940 1945 1950

Pro Asn Pro Pro Ser Asp Gly Ile Ala Gln Asn Val Gly Ile Ala Ile
1955 1960 1965

Thr Gly Ile Ser Phe Trp Leu Ser Leu Met Glu Lys Asp Ile Pro Leu
1970 1975 1980

Tyr Gln Gln Cys Leu Ala Val Ile Gln Gln Ser Phe Pro Ile Arg Trp
1985 1990 1995 2000

Glu Ala Val Ser Val Lys Gly Gly Tyr Lys Gln Lys Trp Ser Thr Arg
2005 2010 2015

Gly Asp Gly Leu Pro Lys Asp Thr Arg Ile Ser Asp Ser Leu Ala Pro
2020 2025 2030

Ile Gly Asn Trp Ile Arg Ser Leu Glu Leu Val Arg Asn Gln Val Arg
2035 2040 2045

Leu Asn Pro Phe Asn Glu Ile Leu Phe Asn Gln Leu Cys Arg Thr Val
2050 2055 2060

Asp Asn His Leu Lys Trp Ser Asn Leu Arg Lys Asn Thr Gly Met Ile
2065 2070 2075 2080

Glu Trp Ile Asn Arg Arg Ile Ser Lys Glu Asp Arg Ser Ile Leu Met
2085 2090 2095

Leu Lys Ser Asp Leu His Glu Glu Asn Ser Trp Arg Asp
2100 2105